# Hopi Water System Strategic Plan

# An Element of the Hopi Arsenic Mitigation Project

## Final Report
**August 2014**

**Prepared for:**

## The Hopi Tribe
## and
## The Indian Health Service

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# 1. Introduction

The Hopi Tribe proposes to construct a regional drinking water transmission system to provide groundwater to Villages on the First and Second Mesas of the Hopi Indian Reservation. Existing wells in these Villages are high in arsenic. The proposed water system, known as the Hopi Arsenic Mitigation Project (HAMP), is intended to eliminate the use of the existing Village wells, and to provide a water supply that meets US EPA drinking water standards for arsenic and is sufficient to meet future Village water demands.

The proposed HAMP facilities are described in the Sept. 2014 Preliminary Engineering Report (PER) as prepared by the Indian Health Service. This HAMP Water System Strategic Plan (WSSP) is intended to identify the operating and administrative requirements to develop and manage the new water system. The WSSP recommends that the tribe establish a new water utility organization to manage, operate, and maintain the HAMP water system.

The primary purpose of the WSSP is to provide a comprehensive outline of the requirements to form, establish, operate, maintain, and sustain a new Hopi water utility and HAMP water system. It is intended to identify necessary elements to provide the following:

- Asset maintenance and sustainability
    - Section 3
- Operation and maintenance plans and costs
    - Sections 4, 5, 6, 7, and 8
- Organization and staffing
    - Section 9
- Administrative and business requirements and plans
    - Sections 9 through 13
- Costs and financial plans
    - Section 14
- Implementation plan
    - Section 15

The WSSP is based on information provided in the PER. Some of the facilities and assumptions in that report may change after completion of this report as the system design and construction processes are completed.

The strategic plan is grounded in asset management principles to provide a sustainable utility organization, water supply and distribution system, and to identify long term costs and requirements to maintain and sustain the system and its level of service.

The plan generally reflects current water system practices as advocated by the American Water Works Association, USEPA, Indian Health Service, and other organizations, with consideration of the Hopi culture and traditions. The plan will need to be adjusted based on input and decisions by the Tribe and Villages, available funding, and the final design and construction of the HAMP system and facilities.

This report is intended to provide information on the proposed water utility organization and operation for review by the Tribe, Villages, IHS and USEPA. After the conclusion of scheduled Public Outreach meetings to be conducted in Hopi Villages, public comments may be received for subsequent inclusion to the WSSP. At that time the final WSSP will be distributed with an implementation plan for the new utility organization based on currently available information.

# 2. Level of Service

The level of service for the HAMP water system is defined in the PER as delivery of water from a well field in the vicinity of Turquoise Trail to the participating Villages. A new regional water utility, the Hopi Public Utility Authority (HPUA), would be created and be responsible for constructing, operating, maintaining and managing the new HAMP system to include the delivery of water to each Village through a master water meter. (Design and construction management of the initial HAMP system is currently planned to be conducted by the IHS). Water would be purchased by the Villages from the proposed HPUA which would act as water 'wholesaler' to the Villages. As planned, the Villages would continue to maintain ownership, and continue to operate and maintain their respective water systems. The Tribe would initially own the HAMP system.

The wholesaler approach described in the previous paragraph is the basis of this Strategic Plan, but the planned service level may change in the future if one or more Villages elect to have the HPUA take over operation and maintenance of their system(s). The level of service objectives for the utility organization include providing adequate supply, pressure and water quality at the delivery point to the Villages. Water supply capacity is built into the system for both current and future growth as defined in the PER. The supply capacity is further reinforced with new regional water storage capacity in the HAMP that is about twice the projected average day demand. Peak day capacity is equal to the maximum capacity of the well pumps or about two times the average day demand with one well out of service.

Typical water system operating pressures range from 40 to 80 psi, with a minimum of 20 psi in the distribution system. The HAMP system is not designed for fire protection flows, but some fire protection capacity will exist within HAMP-system water storage tanks and well-pumping capacities.

Drinking water quality standards and requirements are established by the USEPA and directly addressed in the Strategic Plan.

For determining operating requirements and costs, the average water demand estimated for the year 2015 in the PER is used, with the understanding that the actual year of connection is not known and construction of the entire system may be phased over several years The average day demands or usage are summarized in Table 2.1 on the following page.

The WSSP recommendations are based on current standards and practices for municipal water systems. These standards include preventive maintenance and asset management practices to ensure sustainability of the system in the future.

***Table 2.1 – Estimated Average Day Water Demands (gpd)***

| Village or Facility | Initial Year 2015 | Future Year 2035 |
|---|---|---|
| FMCV (Polacca) | 141,770 | 202,600 |
| Shungopavi | 29,540 | 42,230 |
| Lower Sipaulovi/Mishongnovi | 20,290 | 29,000 |
| Upper Sipaulovi/Mishongnovi | 5,970 | 8,530 |
| Total | 197,570 | 282,360 |

# 3. Asset Replacement and Rehabilitation

One of the keys to sustaining the HAMP system is to manage the major assets by providing adequate funds for ongoing maintenance and for future rehabilitation and replacement (R&R). All facilities and equipment have a limited expected service life before they fail and need to be replaced. That service life depends on a number of conditions including the surrounding environment, usage, routine maintenance, and periodic rehabilitation or overhaul. Table 3.1 lists typical expected service life for the types of equipment and facilities included in the HAMP water system.

***Table 3.1 – Estimated Asset Life and Rehabilitation Frequency***

| Asset Category | Expected Useful Life[1] (YRS) | Estimated Rehabilitation Frequency[2] (YRS) |
|---|---|---|
| Wells (casing & screens) | 40 | 15 |
| Well Pump, Motor, & Column | 30 | 10 |
| Structure/Building | 40 | 15 |
| Water Storage Tank | 40 | 15 |
| Electrical Equipment | 30 | 10 |
| Control/Telemetry Equipment | 10 | none |
| HVAC Equipment | 20 | 5 |
| Standby Diesel Generator | 25 | 5 |
| Primary Diesel Generator | 10 | 5 |
| Surge Tank | 30 | 10 |
| Surge Tank Air System | 15 | 5 |
| Chemical Feed Pumps | 10 | 5 |
| Altitude Valves | 20 | 5 |
| Pipelines | 75 | none |
| Valves, Isolation | 30 | 15 |
| Pressure Regulating Valves | 20 | 5 |
| Air Release Valves | 20 | 5 |
| Flowmeters | 25 | 10 |
| Backflow Preventers | 20 | 5 |
| Booster Pumps & Motors | 20 | 10 |
| Vehicles | 6 | 3 |
| Arsenic Treatment Process | 20 | 5 |

[1]Based on regular preventive maintenance and rehabilitation. For planning only; actual life will vary with the service requirements and other conditions.
[2]General estimate of frequency for major overhaul or refurbishment.

Table D.1 in Appendix D lists the expected major assets in the HAMP system, known as the asset register. This is a preliminary list that will be revised upon completion of detailed design and construction of the system, along with specific information on size, type, and manufacturer of

equipment, piping and structures. Appendix C contains a typical asset data template that can be used to characterize each actual asset and to summarize the important information used to manage each asset including:

- Type of asset and characteristics and specifications
- Performance objective
- Criticality
- Expected life
- Initial cost
- Estimated annual costs
- Maintenance schedule
- Rehabilitation schedule

Asset life cycle costs include the cost of operation and routine maintenance, but also include the costs for repair and rehabilitation, and for replacement of equipment and facilities. Estimated operation and maintenance requirements for the HAMP system are identified in Section 4. The costs of O&M for the planned HAMP assets are described in Section 8.

Rehabilitation and replacement costs are based on the initial costs for the assets and similar water facility R&R costs and are listed in Table D.1. The costs for rehabilitation and replacement of each asset through the design life of 20 years are converted to equivalent annual costs and listed in Table D.1. Note that some assets, such as control systems, are not practical to rehabilitate and are replaced when they are no longer functional or have exceeded their useful life.

For effective asset management, it is recommended that a rehabilitation and replacement fund be developed to provide an adequate budget to sustain the equipment and to replace it at the end of its useful life. It would not be practical for HPUA to fully fund all future capital replacement. The assumption is made that estimated costs for rehabilitation and replacement that are scheduled to occur through the design life of the project, up to but not including year 20, will be used to determine the initial contribution to an R&R reserve fund. Based on this assumption and the calculation of annual R&R costs shown in Table D.1, an annual contribution of $50,000 is recommended. This includes $25,000 for scheduled replacement and $25,000 for scheduled rehabilitation.

The annual contribution of $50,000 would be set aside in a dedicated fund for future rehabilitation and repair. This fund can also pay for premature failures and replacement of assets, but may require some adjustment of the annual contribution amount.

Development of an R&R fund avoids large year-to-year increases for extraordinary expenses such as water storage tank repainting, and well pumps replacement. It also helps fulfill the EPA directive that the HAMP utility organization provides an asset management program to maintain financial sustainability of the HAMP system in the future.

# 4. Operation and Maintenance (O&M) Plan

## System Operating Strategies

The initial system operating strategy includes local automatic operation of most of the HAMP facilities. This means the equipment will start and stop based on different measurements in the system. These include the following:

- The well pumps will start and stop based on the water level in the new Radio Tower storage tank.
- The booster pumps will be operated automatically based on water levels in the Shungopavi tank and the new Sipaulovi tank.
- Hypochlorite pumps at the HAMP wells will be used to chlorinate the pipelines as needed, and will operate automatically when the well pumps are operating. Village-utility owned and operated hypochlorite pumps at village-based chlorination stations will be automated to operate proportionally in response to flows through the village-utility flowmeters.
- Air compressors will be operated automatically to maintain pressure in the surge tanks.

Remote signals, such as from the Radio Tower storage tank, will be telemetered or communicated by radio signals to the well building.

Alarm conditions will also be automated and alarms sent to system operators with a dial-out system from the well building and from the booster station.

All automatic controls will be backed up by local manual operation capability in the event of any communication or automatic system failure.

## Routine Operating Tasks

Since all systems are operated and monitored locally rather than from a central location, it is necessary that the equipment and systems be checked by system operators on a daily basis. The following table indicates the routine operating tasks anticipated to be needed to monitor the equipment and identify any abnormal or failed conditions.

***Table 4.1 – Routine Operating Tasks***

| Routine Operating Tasks | Frequency | Travel Time[1] | On-Site Time |
|---|---|---|---|
| 1. Check, inspect, and record well equipment | Daily | 1 hour/day | 1 hour/day |
| 2. Maintain and clean well building | Weekly | | Avg 4 hour/week |
| 3. Check Radio Tower storage tank and valves | Weekly | 1 hour/week[2] | 15 min/week |
| 4. Check, inspect, and record booster pump station | Daily | 20 min/day | 1 hour/day |
| 5. Maintain and clean Radio Tower booster station | Weekly | | Avg 4 hour/week |

| Routine Operating Tasks | Frequency | Travel Time[1] | On-Site Time |
|---|---|---|---|
| 6. Check Upper Sipaulovi storage tank, meter, and valves | Weekly | 20 min/week | 15 min/week |
| 7. Check Village chlorination, meters and valves[3] (3) | Weekly | 1 hour/week | 45 min/week |
| 8. Inspect pipeline and valves | Monthly | 4 hour/month | 30 min/month |
| 9. Water samples to lab (Flagstaff) | Monthly | 4 hour/month | 30 min/month |

[1]To and from assumed central Administration and Service Building
[2]To and from Indian Route 4 as part of well inspection
[3]This task could be performed by the Village water system operators in the future.

Routine operating tasks:

- Check, inspect, and record includes visual inspection for proper operation, leaks, noise, damage, etc., equipment adjustment, and recording findings and operating data such as flows, levels, chemical settings, etc. It also includes routine operator tests and sample collection.
- Routine maintain and clean includes preventive maintenance such as lubrication, adding oil, loading chemicals, cleaning spills, cleaning buildings, etc.
- Checking storage tanks includes visual inspection of site for damage and proper operation of tank, valves and meter.
- Inspecting pipelines includes driving the pipeline route for evidence of damage, leakage, vandalism and proper operation of air relief or PRV valves.
- Transporting samples to the lab includes preparation time and time at the lab. (Sample transportation could be shared with samples from the Village distribution systems.)

Total time for routine operating tasks in Table 4.1 is estimated to be 160 hours/month without including breaks, lunch, time in office, etc. It also does not include time off for illness, training, or traditional Hopi ceremonial events. This is approximately equivalent to a full time person (avg. 173 working hours per month).

## Preventive Maintenance Schedule (PM)

Preventive maintenance activities are intended to sustain the operation of the equipment and identify any potential problems. Typical PM tasks are listed in Table 4.2 along with estimated labor hours and costs of regular PM activities. Some PM tasks are part of routine operation checks as indicated in Table 4.2. The PM task estimates do not include unscheduled repair or overhaul of equipment or components, or replacement parts, which would be additional time and expense to the time and costs estimated in Table 4.2.

These initial PM tasks and schedules will need to be verified and adjusted based on installed equipment manufacturers' recommendations and actual experience with operation.

***Table 4.2 – Routine Preventive Maintenance Tasks***

| Equipment | Maintenance Task | Frequency | Hours or Cost, each |
|---|---|---|---|
| Well Pumps and Motor (2) | Pull and inspect | Every 5 years after 10 years | Contractor $10,000 |
| | Observe operation vs. targets:<br>• Running hours<br>• Total Flow<br>• Flow Rate<br>• Pressure<br>• Amps | Daily | Routine operation |
| | Measure well static and operating water levels both wells | Quarterly | 4 hours |
| | Calibrate flowmeters (2) | 6 months | 2 hours |
| Hypochlorite Pumps (2 each at 2 wells) | Monitor and record operation | Daily | Routine operation |
| | Inspect and clean suction strainers and pump heads, calibrate | Monthly | 1 hour |
| Surge Tanks (2) | Test relief valves and controls<br>Clean sight glass as necessary | Monthly | Routine operation |
| | Exercise valves | 6 months | 1 hour |
| Surge Tank Air Compressors (2) | Check oil level<br>Drain receiver tank | Weekly | Routine operation |
| | Change oil (if necessary), adjust | 6 months | 2 hours |
| Standby Generators (2) | Exercise and observe operation | Monthly | 1 hour |
| | Clean and inspect | Quarterly | 1 hour |
| | Load test | 6 months | 1 hour |
| | Check fuel level and condition | Monthly | Routine operation |
| Water Storage Tanks (2) | Check and calibrate level measurement | Annually | 4 hours – 2 people |
| | Test and calibrate valves | Quarterly | 2 hours |
| | Internal inspection | Every 5 years after 10 years | Contractor $5,000 |
| Booster Pumps (4) | Observe operation vs. targets<br>• Running hours<br>• Total Flow<br>• Flow Rate<br>• Pressure<br>• Amps | Daily | Routine operation |
| | Lubricate and adjust as necessary | Quarterly | 1 hour |
| | Pull and inspect | 3 years | 4 hours |
| | Calibrate flowmeters (2) | 6 months | 2 hours |
| Transmission Pipelines | Inspect and check operation of air release valves | Monthly | 4 hours |
| | Inspect and exercise isolation valves | Annually | 16 hours – 2 people |
| | Test and calibrate PRV | Quarterly | 2 hours |

| Equipment | Maintenance Task | Frequency | Hours or Cost, each |
|---|---|---|---|
| Electrical SES & MCCs (2) | Inspect and clean | Annually | 1 hour |
| | Infrared survey | 5 years | Contractor $5,000 |
| | Breaker test and calibration | 10 years | Contractor $10,000 |
| | | | |
| Total On-site Time | | | 230 hours/yr |
| Travel Time | | | 230 hours/yr |
| Avg PM Hours | | | 38 hours/mo |
| Avg Contractor Cost | | | $5,000/year |

Repair and corrective maintenance is not included in the routine preventive maintenance tasks in Table 4.2, and is difficult to predict for a new system. Industry rule of thumb for total maintenance costs is 1 to 2% of installed value. For the HAMP system, the installed value of equipment and structures, excluding pipelines, is about $3,000,000. The resulting estimated total maintenance cost would be $30,000 to $60,000 per year. The preventive maintenance total cost in Table 4.2 is about $15,000 per year considering labor and supplies. A reasonable estimate or contingency for repair and corrective maintenance in the first years of the HAMP, considering all equipment is new, is $20,000 per year.

## Sampling and Analysis Plan and Schedule

The HAMP system will be considered to be a new groundwater source for water-quality monitoring requirements. As such there is a more intensive testing program required during the first year of operation. After the first year, the sampling and testing frequency may decrease if the testing results for the first year demonstrate that the water quality is within the USEPA drinking water standards Maximum Contaminant Limits (MCLs).

All tests, other than chlorine residual, will need to be performed by a laboratory certified for water quality analysis. This requires proper preparation of samples and transport to a laboratory in Flagstaff, the NTUA lab in Ft. Defiance, or other commercial laboratory.

Table 4.3 summarizes the routine testing schedule for the HAMP system. Specific sampling requirements may change based on the initial system constructed and on test results from the 1st year. Specific sampling locations will be determined after the system design is completed. The system design will include taps and other appurtenances at appropriate locations for sample collection.

***Table 4.3 – Regulatory Sampling and Analysis Schedule (HAMP system only)***

| Constituent | 1st Year Frequency | Future Frequency [1] | Sampling Locations |
|---|---|---|---|
| Chlorine Residual | Weekly | Weekly | • After HAMP well chlorinator<br>• At each Village connection |
| Total Coliforms[2] | Monthly | Monthly | At each Village connection |

| Constituent | 1st Year Frequency | Future Frequency [1] | Sampling Locations |
|---|---|---|---|
| Lead and Copper[3] | Every 6 Months | • Annually 2nd Year<br>• Every 3 Years after 2nd year | At each Village connection |
| Nitrate | Quarterly | Annually | At each HAMP well |
| Nitrite | Quarterly | Never | At each HAMP well |
| Stage 1 DBPs | Annually | Annually | At each Village connection |
| Stage 2 DBPs | Annually | Annually | At each Village connection |
| Inorganics | Quarterly | Every 3 Years | At each HAMP well |
| Pesticides and SOCs | Quarterly | Every 3 Years | At each HAMP well |
| VOCs | Quarterly | Every 3 Years | At each HAMP well |
| Radionuclides | Quarterly | Every 9 Years | At each HAMP well |

[1]Future frequency based on results of 1st Year assuming no exceedances of MCLs or minimum standards.
[2]Coliform samples are required at representative locations throughout the water distribution system, which includes the Village systems. These samples will continue to be collected by Village operators. For the HAMP system only, monthly coliform samples are recommended at every Village connection.
[3]Lead and copper are required at consumer taps throughout the water distribution system, which includes the Village systems. These samples will continue to be collected by Village operators. For the HAMP only, lead and copper are recommended at every Village connection every 6 months.

DBPs: Disinfection By-Products. Village systems must also sample for DBPs.

SOCs: Synthetic Organic Compounds

VOCs: Volatile Organic Compounds

Operators will need to conduct on-site tests each week or on a similar regular schedule to monitor operations and water quality. These tasks are performed as part of regular operating duties. Operator tests may also be necessary in response to emergencies such as line breaks, dirty water, or possible contamination. Typical operator tests would include:

- Chlorine residual – test kit
- pH – portable meter
- Turbidity – bench analyser
- Conductivity – portable meter

## Annual Consumer Confidence Report

USEPA drinking water rules require an annual report to all water users that describes the condition of the water system, and a summary of the results of water quality testing. This report is the

responsibility of each Village for their water system. HPUA will need to provide HAMP water quality data and other informationto each of the Village system operators for preparation of the CCR for each Village.

# 5. Support Facilities and Equipment

## O&M Equipment

Operation and maintenance of the HAMP system requires specific tools and equipment. The following list is an initial estimate of the tools and equipment required, including critical repair and spare parts. The tool and equipment requirements are expected to change based on actual operating and maintenance experience.

### *Vehicles*

- Service truck with tool boxes and lift gate or truck-mounted hoist.

  The service truck would allow tools and parts to be regularly available at the remote locations. The hoist is for loading and unloading large parts and equipment, and chemical drums.

- All-terrain vehicle for access to the pipeline route.

  This smaller, 4 wheel drive ATV would be used for travel over minimally maintained roads to reduce wear and tear and extend the longevity of the service truck.

- Heavy Equipment

  Backhoe and dump truck for pipe and valve repair.

  Crane truck for lifting pumps, pipe segments, valves, and other equipment.

  It is not practical to purchase heavy equipment for its expected limited use. However, access to heavy equipment should be in place at the start of operation from a contractor, an equipment rental firm, or from the VUMC. See the discussion of a potential VUMC role in HAMP in Section 9.

### *Water Testing Equipment*

- Bench-top Spectrophotometer and Turbidimeter
- Portable meters (pH, conductivity)
- Portable test kits and reagents
- Assorted glassware and lab supplies
- Sample refrigerator

### *Tools*

- Assorted hand tools, e.g. wrenches, screwdrivers, etc.
- Power tools, e.g. drill, saws, sander, etc.
- Continuity tester (e.g. Fluke meter)

- Portable gas-driven pipe saw
- Shovels and digging tools
- Bench tools including vise, grinder, and others
- Metal detector

### *Repair and Spare Parts*

- Pipe repair sleeves and clamps – various sizes for HDPE, PVC, and DI pipe
- Spare pipe lengths (two each size and type)
- Spare valves (one each size and type)
- PRV diaphragms (one each size or type)
- Spare chemical feed pump
- Other spare parts recommended by specific equipment manufacturers
- Chemical pump and tank for remote chlorination

## Facilities

### *Well Building*

A building is intended to enclose the equipment associated with all three planned wells at the Turquoise Trail well site. While the Turquoise Trail well-pumps are anticipated to be the submersible type, the well building will enclose the electrical and controls equipment, surge tank and air system, and chlorination equipment.

A prefabricated steel building is anticipated with dimensions of about 20' by 30' to accommodate the 5,000-gallon surge tank, other equipment, and some storage. A composting toilet would be desirable for this remote location.

### *Booster Station*

A single booster station, named the Radio Tower booster station, is planned to house four booster pumps for the Second Mesa Villages. The building will also house the pumps and piping, electrical equipment, and surge tank and air system.

A prefabricated steel building is anticipated with dimensions of about 20' by 30' to accommodate a 2,500-gallon surge tank, and pumping and electrical equipment.

### *Operations Center*

Support facilities are required for field operations and for administration of the HPUA. This facility would house storage, maintenance, administration, training, and meeting space to support the operation and maintenance of the system, and the administrative functions of the HPUA regional utility.

The facility would also be the contact location for any future utility system customers that become part of the HPUA.

The following functions and approximate floor areas are recommended to be housed in a central support facility:

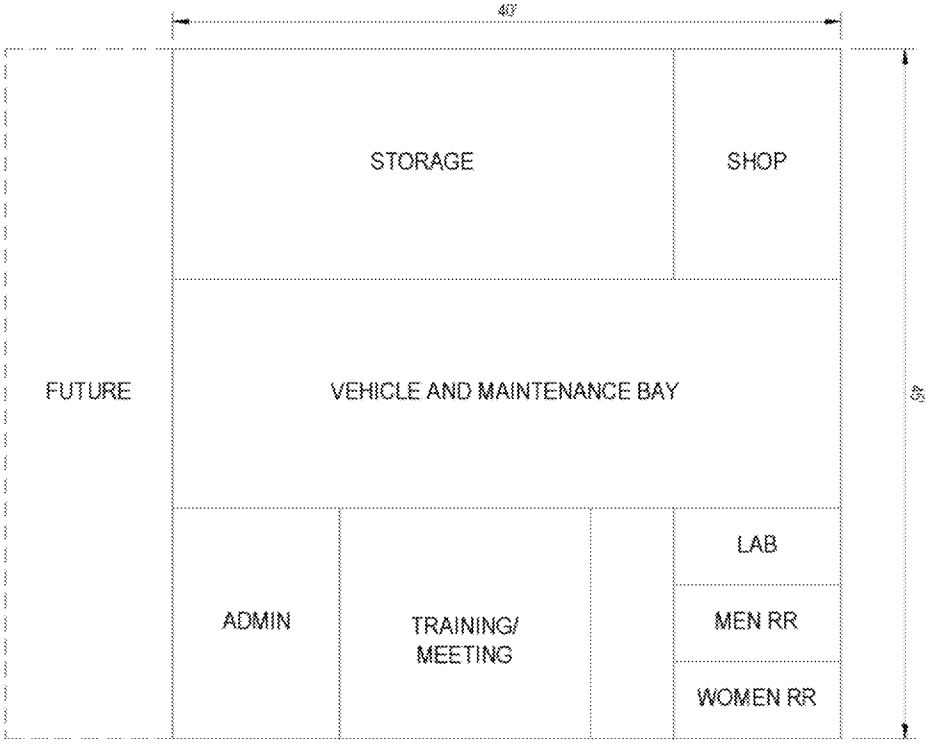
- Storage for parts, equipment, chemicals, and tools, including shelving (450 sf).
- Vehicle storage and maintenance bay with overhead crane (450 sf).
- Shop area and workbench for equipment repairs (150 sf).
- Lab facilities including storage cabinets, sink and sample refrigerator (100 sf).
- Training and meeting room including small kitchen (250 sf).
- Administrative office (150 sf).
- Rest rooms for men and women (150 sf).
- Yard area for storage of large items such as pipes, backfill, and vehicle parking.

Total building footprint is approximately 1,800 sf. Land needed is a minimum of ½ acre.

A prefabricated steel building is recommended and should have the capability to be expanded in the future if the utility expands.

An example layout of the central support facility is shown in Figure 5.1

**Figure 5.1 – Example Support Facility Layout**



The Operations Center should be centrally located. The location will be determined during the design of the HAMP system, which includes design of the Operations Center.

## Field Communications System

One of the requirements of operating the regional system is the staff's ability to communicate remotely during both routine and emergency situations. This may include requesting system information or assistance when in the field, for staff safety when operating alone, or for requesting aid and coordinating people during an emergency.

Cellular phone service on the reservation is not fully reliable, and hand-held radios (walkie-talkies) lack the range to cover the entire system.

One workable option is a private mobile radio (PMR) system. This is similar to systems used by other utilities for communicating with staff in remote locations or over wide areas. This is a typical system used by utility crews in urban and rural areas. The PMR consists of a base station, and in the case of the Hopi reservation, multiple repeaters to provide coverage over the entire regional system. Radios can be mounted in vehicles for greater range (within 15 to 20 miles of a base station or repeater). Hand-held radios can be used, but must be within 2 or 3 miles of the base or repeater.

The costs of a PMR can vary widely depending on the number of repeaters and number of users or radios. Implementation will require a radio study, FAA licensing, and ongoing maintenance. An estimated range of costs for implementation is $10,000 to $25,000.

# 6. Personnel Safety

Operators and other personnel working on the HAMP facilities can be subject to multiple possible hazards in the course of their work. This strategic plan does not provide a detailed safety plan, but possible personnel hazards are identified to determine mitigating measures and equipment needed to provide a safe working environment.

***Table 6.1 – Personnel Safety Hazards Summary***

| Possible Hazard | Prevention Measures |
|---|---|
| Vehicles and heavy equipment | • Driver training<br>• Equipment operator qualification |
| Working alone | • Continuous communication system<br>• Notification procedures<br>• Identification of restricted tasks |
| Electrical equipment | • Operator training<br>• Lock out/tag out procedures<br>• Electrical equipment access procedures including Arc Flash procedures and protection for high voltage equipment |
| Hypochlorite handling | • Training and refreshers<br>• Personal protective equipment (gloves, face shield, chemical goggles, apron) |
| Climbing (water tanks) | • Tie-off equipment<br>• Fall prevention procedures |
| Confined spaces (tanks and vaults) | • Ventilation equipment<br>• Portable gas meters<br>• Confined space identification, procedures and training |
| Traffic | • Traffic safety procedures and training<br>• Traffic safety vests<br>• Roadway closure coordination procedures |
| Construction | • Trench safety procedures and training<br>• Personal protective equipment (hardhat, hard toe boots) |
| Desert conditions (heat, dehydration, snakes, scorpions, etc.) | • Training and awareness, including first aid and CPR training and certification |
| High pressure water | • Identification of high system pressure locations<br>• System access procedures and training |

Several areas of specific safety procedures and requirements are identified in Table 7.1. Specific safety procedures for the HAMP facilities need to be developed upon completion of the design, including the following:

- Lock out/tag out procedures including tags and locks
- Electrical equipment and panels access restrictions and procedures
- Confined space procedures, identification of confined spaces, and restricted areas
- Climbing and tie-off requirements and restrictions
- Construction and trench restrictions and procedures
- Procedures and restrictions when working alone
- Chemical handling

Recommended personal protective equipment (PPE) for all HAMP workers includes:

- Hard hat
- Safety vest
- Gloves, rubber and work
- Safety glasses
- Hard-toed shoes
- Chemical goggles, full face shield, and rubber apron located at chemical usage areas (specifically hypochlorite handling at the well building)

## Recommended safety equipment

- Portable gas detector
- Traffic cones
- Harness and tie-off equipment
- Confined space entry equipment if required (based on confined space inventory to include harness, tripod and winch)
- Electrical equipment locks and tags
- Arc Flash protective equipment

## Training Topics

There are a wide array of safety training program and trainers, including on-line training. These include everything from driver training, construction safety, to office safety. The following are some specific safety training areas as well as areas of regular refresher training related to the most common hazards around HAMP facilities:

- Electrical safety training, and lock-out tag-out procedures
- Confined space hazards and requirements
- Hypochlorite and other chemical handling

- Traffic safety procedures
- Construction safety
- First aid and CPR

# 7. Vulnerability and Emergency Response

To develop an effective response to emergencies, it is essential to identify likely hazards that could adversely impact the water system. The emergency plan is then created to reduce, prepare for, and respond to those hazards.

This section identifies potential hazards and their vulnerabilities and impacts on the planned HAMP water system. This information is also valuable in design of the facilities to include facility elements to minimize the likelihood and impact of the hazards where practical.

The following hazards are considered most likely to occur on the Hopi Reservation and impact the HAMP system. This list is not all-inclusive and other hazards that are less likely to occur could also impact the system. High probability of likelihood is once per year or more, moderate is once or more every five years, and low probability occurs less than once every five years.

***Table 7.1 – HAMP Potential Hazard Summary***

| Human-Caused Hazards | | |
|---|---|---|
| **Potential Hazard** | **Description** | **Likelihood** |
| Theft | Theft of system components and equipment can occur considering the remote location of many of the facilities. | This has a **moderate probability** of occurring, particularly if caused by outsiders. |
| Vandalism | Vandalism can include damage to facilities, but may also include graffiti or "tagging." It could also be opening valves which would cause loss of water. | This has a **moderate probability** of occurring, particularly if caused by outsiders. |
| Sabotage | Deliberate damage or destruction of property with the intent to inhibit the system. | **Low probability** considering not a high target for terrorism or retaliation. |
| Contamination | Contamination can occur from deliberate or accidental spills or adding contaminants to the water system through storage tanks, valves, or other opening. | This is considered a **low probability** but requires appropriate well design and security measures on all facilities. |
| Extended Power Supply Loss | This hazard is a general or widespread loss of power for an extended time such as blackout for more than two days. This hazard occurs because of conditions outside the HAMP area. | While local power losses are expected to occur frequently, standby power generators would adequately prevent loss of water supply. An extended and widespread power outage has a **low probability** but would potentially cause loss of water supply as well as disruption of response. |

| Natural Hazards | | |
|---|---|---|
| **Potential Hazard** | **Description** | **Likelihood** |
| Lightning | Lighting may strike multiple facilities with potential for power loss and damage. | **High probability** in any year. |
| Fire | Fire hazards could include wildfires and building or electrical fires within HAMP facilities. | **Low probability** considering the surrounding environment of the water system and modern building techniques. |
| Ice/Freezing | Ice or snow storms and freezing conditions can damage water system components like valves and piping. Ice or snow storms can prevent personnel from operating or responding to emergencies. | **High probability** due to climate on the reservation. Freeze protection can be built into the design of facilities. |
| Flooding | Flooding of the HAMP is caused by flash floods that will tend to wash out pipelines. | **Moderate probability** that should be addressed to the extent practical during design. |
| Wind | High winds are a frequent occurrence and can cause damage to structures or take down power lines to HAMP facilities. | **Moderate probability** considering damaging winds can occur on the reservation. |

Table 7.2 summarizes how the likely hazards could impact the HAMP facilities and generally describes each facility's vulnerability. This impact is generally rated without considering mitigating measures such as lightning arresters, meters in vaults, etc. It does consider proper design to avoid locating facilities in a possible flood area.

The likelihood of a hazard impacting each type of asset is indicated by the following rating in Table 7.2:

H: High – impact could occur one or more times per year

M: Moderate – impact could occur more than once in 5 years

L: Low – impact could occur less than once every 5 years

N: No impact

***Table 7.2 – Vulnerability Assessment***

| Facilities | Threats | | | | | | | | | Vulnerabilities/Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Natural | | | | | |
| | Theft | Vandalism | Sabotage | Contamination | Lightning | Fire | Ice/ Freezing | Flood | Wind | |
| Pipelines & Valves | L | M | L | L | L | L | H | H | N | • Pipelines are buried but valves are accessible and vulnerable to intentional damage.<br>• Some transmission line valves (air release, drain) may be subject to freezing if exposed.<br>• Pipelines are subject to undermining from erosion and flooding. |
| Wells | L | M | L | M | H | N | M | L | M | • Well head piping and valves may be accessible (depending on design) or could be enclosed in the well building.<br>• Power supply assets (cables, transformers, etc.) are critical and may be vulnerable depending on location and design. Should be hardened or installed underground.<br>• Access to well, e.g. sampling and sounding tubes, allows contamination if not secured. |
| Well Building | M | M | L | L | H | M | M | L | M | • Controls and electrical equipment are critical and need to be in secure, locked structure to prevent damage.<br>• External power supply is vulnerable and should be hardened or installed underground.<br>• Equipment, tools, and supplies are vulnerable to theft.<br>• All equipment should be housed where possible for security and weather protection.<br>• Security alarm, such as door entry, should be included as a dial out alarm.<br>• Hydrogen gas from hypochlorite generator is potential safety hazard. |

| Facilities | Threats | | | | | | | | | Vulnerabilities/Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Natural | | | | | |
| | Theft | Vandalism | Sabotage | Contamination | Lightning | Fire | Ice/ Freezing | Flood | Wind | |
| Booster Station | M | M | L | L | H | M | M | L | M | • Controls and electrical equipment are critical and need to be in secure, locked structure.<br>• External power supply is vulnerable and should be hardened or underground.<br>• All equipment should be housed where possible for security and weather protection.<br>• Security alarm, such as door entry, should be included as a dial-out alarm. |
| Storage Tanks | L | H | L | M | H | N | H | N | H | • Tank is a graffiti (tagging) attraction.<br>• Climbing hazard attraction requires secured ladders and potentially chain link fence.<br>• Climbing fall-arrest system required for safety.<br>• All access points (hatches, overflows, etc.) need to be secured. |
| Surge Tanks | L | M | L | L | L | L | H | L | L | • Tanks, fittings, valves, etc. are vulnerable to damage and weather.<br>• Tank is a graffiti target.<br>• Tanks should be inside buildings if possible. |
| Altitude Valves | L | M | L | L | L | N | H | M | N | • Valves are vulnerable to damage if exposed.<br>• Should be in secured underground vaults which are potential confined space. |
| Meters/BF Preventers | M | M | M | L | L | L | H | M | N | • Meters and backflow preventers subject to damage, theft, and tampering.<br>• Should be in secured underground vaults which are potential confined space. |
| Village Chlorination Systems | M | H | M | M | M | L | M | L | M | • External power supply is vulnerable and should be hardened or underground.<br>• All equipment should be housed where possible for security and weather protection.<br>• Security alarm, such as door entry, should be included as a dial out alarm.<br>• Hydrogen gas from hypochlorite generator is potential safety hazard. |

| Facilities | Threats | | | | | | | | | Vulnerabilities/Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Natural | | | | | |
| | Theft | Vandalism | Sabotage | Contamination | Lightning | Fire | Ice/ Freezing | Flood | Wind | |
| Vehicles & Equipment | M | L | L | N | N | L | M | L | L | • Major threat of theft as well as damage.<br>• Secure storage in a building is required. |
| Operations Building | H | M | L | N | M | L | M | L | M | • Records are vulnerable to vandalism and fire.<br>• Radio and computer equipment target for theft and damage from lightning.<br>• Damage to building from wind, fire and ice. |
| Likelihood of impact:<br>H: high (>1/year)<br>M: moderate (>1 per 5years)<br>L: low (<1 per 5 years)<br>N: no impact | | | | | | | | | | |

## Critical Facilities

The following are estimated to be the most critical facilities for continuous delivery of water:

1. Pipeline – major breaks can cause loss of total or partial water supply for more than 48 hours.
2. Loss of well supply – wells are redundant, but loss of power supply or aquifer contamination could cause loss of total water supply.
3. Radio Tower booster station – booster pumps are redundant, but loss of power supply, fire, or other hazards could cause loss of supply to Second Mesa Villages.
4. Water storage – loss of storage in conjunction with other system losses would eliminate emergency storage.

## Existing Response Capability

There will be some capabilities within the planned HAMP facilities to respond to emergencies and to mitigate the impacts of hazards.

***Water Storage:***

- New Radio Tower storage tank (260,000 gal): 1 to 2 days for loss of well supply
- New Upper Sipaulovi tank (110,000 gal): 2 to 3 days for loss of booster station or local pipeline
- Existing Shungopavi tank (250,000 gal): about 3 days for Shungopavi Village
- Existing Polacca tank (500,000 gal): 1 to 2 days for First Mesa Villages (pumping required)

***Standby Generators***

A permanent standby generator is proposed for each Turquoise Trail well, and one for the new booster station. These generators would mitigate the loss of power supply.

***Redundancy***

Redundant wells and redundant pumps will mitigate the failure of these system components.

***Existing Village Wells***

The existing Village wells will be disconnected from their respective systems. However, plans and materials could be in place to reconnect the wells in an emergency with loss of water supply from the HAMP.

## Identification of Emergencies

***Prior Warning***

Some emergencies will be identified with prior warning such as weather forecasts of impending severe storms, flooding, high winds, and ice or snow storms. These advance warnings provide the

opportunity to alert staff and contractors and to make sure there are adequate supplies and other provisions to support the staff.

***Sudden***

Most emergencies will occur without prior warning. Such emergencies are normally identified by loss of service or notification from people in the area. Response to sudden emergencies relies on an effective communication and notification system. Immediate response is necessary to identify the problem and potential causes to determine the correct responses. Alarms at the wells and booster stations should be sent to operators on call, through a remote dial-up or through the proposed local radio network.

The effectiveness of emergency response is a result of staff training and experience, as well as specific emergency response procedures for different conditions or emergencies.

## Specific Emergency Response Plans

Specific emergency response plans will need to be developed after the utility organization is established, including interagency agreements and contractor agreements for response. The following are examples of emergency response plans and actions for some conditions that could impact the HAMP system. These plans are an outline and examples of the type of specific emergency procedures and resources necessary for a comprehensive emergency response plan.

***Transmission Pipeline Break***

Indicated by loss of water supply and pressure.

*Isolate break*

- Map and valve ties or GPS are needed to enable isolating the break as quickly as possible.
- Storage tanks should be isolated as soon as possible, depending on the break location.
- Depending on the break location, it may be necessary to shut down wells as soon as possible.
- Staff should have specific assigned tasks to expedite the response.

*Mobilize repair contractor*

Prior arrangements for contractors or other agencies for excavation and repair will be needed, along with an inventory of repair sleeves and clamps.

*Notify Villages (or Users Directly)*

A plan for notification of Villages and water users within the Villages should be in place to notify of water loss or cutbacks, including voluntary and mandatory water conservation. The notification plan should include responsibilities for communicating information to the users.

*Repair/Disinfection*

A plan, procedures and equipment are needed for placing the system back in service. This includes a flushing and disinfection plan along with provisions and supplies for water bacteriological testing.

The cause of the break should be determined and actions taken to prevent or mitigate re-occurrence.

## Storage Tank Failure

Generally indicated by a leak, structural failure, or tank overflow. A storage tank could also fail as a result of control failure (e.g. not calling for well pumps) or altitude valve failure (not allowing the tank to fill).

*Isolate the Tank*

This may require isolating the tank using the pipeline if access to the tank site is not possible.

Map and valve ties or GPS are needed to enable isolating the break as quickly as possible.

*Manual Operation of Well Pumps or Booster Stations*

Staff will need to respond to wells or booster stations to operate pumps manually. This will require two people.

Procedures for manual operation should be in place to operate pumps based on discharge pressure.

*Mobilize Tank Repair/Replacement Contractor*

Depending on the type of failure, a specialized structural contractor should be on call for structural repairs.

Some minor failures such as loss of controls or altitude valve failure may be repaired by HAMP staff.

*Plan Disinfection and Return to Service*

If major repair work is required, procedures for disinfecting the tank, including water bacteriological testing should be in place.

## Well Supply Loss

Loss of both Turquoise Trail wells would result in loss of all water supply. Thiscould occur as a result of electrical system damage (e.g. lightning strike or fire). Loss of one well should be considered an emergency since the entire water supply system is then dependent on the one remaining well. Loss of one well could be caused by well pump/motor failure, casing collapse, well column break, or several other conditions. Well repair should be expected to require a minimum of three days, but could take longer.

*Determine the Cause of the Failure If Possible*

*Mobilize Appropriate Contractor*

Depending on the cause of the failure, an electrical contractor or a well contractor may be required.

*Notify Villages (or Users Directly)*

A plan for notification of Villages and water users within the Villages should be in place to notify of water loss or cutbacks, including voluntary and mandatory water conservation. The notification plan should include responsibilities for communicating the information to the users.

*Alternative Water Supply Plans*

Plans and provisions should be developed for alternative water supply. This could include hauling water with prior arrangement for source of supply. Alternative water supply could also include plans and materials to reconnect the existing Village wells.

## Water System Contamination

Water system contamination can be biological, chemical or other type and can be caused by a number of different conditions including construction/repair, cross-connection, aquifer contaminants, and deliberate acts. Indications of contamination may be user complaints of dirty or smelly water, numerous reports or a pattern of illness, or detection by regular laboratory analyses.

*Determine Contamination*

A plan for systematic testing is needed to determine the type of contamination and to isolate the source if possible. This plan would include identified sampling locations and operator field instruments for pH, ORP, and similar rapid tests. There may be different sampling protocols necessary depending on the type and potential location of the contamination.

*Notify Villages and Users*

A plan for notification of Villages and water users within the Villages should be in place to notify of contamination and to avoid using the water for consumption. The notification plan should include responsibilities for communicating the information to the users.

"Boil water" orders should be developed and procedures for distribution of the notices established as part of the response plan.

*Isolate, Flush and Chlorinate*

Depending on the type and location of the contamination, plans and procedures for isolating the source of contamination, flushing portions of the system, and chlorinating the system should be developed.

The system should then be retested for the contaminants before placing back in service.

## Cross Connection Control

Each master meter connection to the Villages or institutions will also have a cross-connection backflow prevention device to protect the HAMP system from contamination. The backflow device will also prevent draining the Village system into the HAMP system in the event of major pipeline break in the HAMP. A double check valve assembly is most suitable for the planned application and size of connecting pipeline. Cross connection devices require annual inspection and testing by a certified inspector, and should initially be the responsibility of the HPUA.

***Temporary Village Wells Connection***

The Village wells will be physically disconnected from the Village distribution system to prevent continued use of the high arsenic wells after the HAMP system is in service. However, these wells could provide a backup water supply in the event of a major emergency, such as a transmission line break, that could cause loss of HAMP water supply for several days. A temporary connection of Village wells could be made with a pre-fabricated spool piece to enable the Village well to be used for a short period of time in an emergency and loss of HAMP water supply. Short term use of these wells for a period of several days is not considered a significant health hazard.

Such use of the Village wells in an emergency as an alternative water supply should be limited to the period of time when HAMP water supply is lost. It should include notification of the HPUA and the EPA that the well is being used, including when it was placed in service and when it was physically disconnected after temporary use.

The Villages will need to have a plan for emergency use of the Village wells, including a program of regularly exercising the existing wells to enable them to be reliably used in an emergency, as well as procedures for connecting, including disinfection, and disconnecting the wells. This plan would need to be approved by the EPA prior to implementation.

## Emergency Response Plan Outline

The following are major topics to be identified and developed for the Emergency Response Plan (ERP):

***Objectives of the Plan and Description of Emergencies***

The objectives of the utility organization in identifying, mitigating, responding and recovering from emergencies should be described including target response time, allowable time for loss of water supply and similar objectives. This section also includes definitions of what conditions constitute an emergency, activation of the emergency plan and procedures, and a list of critical facilities and equipment.

***Table of Organization, Authority, and Responsibilities for Emergency Situations***

This includes secondary or replacement people. Normally, the HPUA Director would be in responsible charge during emergencies but other individuals should be designated to make decisions in his or her absence. Supplemental staffing from other agencies or the Villages should also be identified for major emergencies such as pipeline breaks or structure failures.

### *Communication and Notification Plans*

Communications protocols, phone lists, and other contact information need to be developed and maintained up to date. Communication protocols would include backup for loss of telephone and radio. Notification includes different procedures and prepared notices such as "boil water" and mandatory conservation. It also includes regulatory agency notifications.

### *Sampling and Testing Plans*

Procedures and locations for sampling for different scenarios should be developed and incorporated into the HAMP design. Prior arrangements for emergency testing by a commercial lab should be developed and included.

### *Emergency Response Equipment*

Procurement and/or availability of emergency response equipment should be part of the O&M plan. This would include construction equipment for pipeline repair or other excavation. Prior arrangement for heavy equipment could be through inter-agency agreement or from an on-call contractor.

Access to other equipment should be arranged with other agencies or commercial rental agencies including:

- Portable pumps
- Portable generators
- Emergency lighting
- Concrete/pipe saws
- Portable chlorination equipment

### *Arrangement with Specialty Contractors*

Prior arrangement and on-call agreements with a variety of contractors are recommended including:

- Well contractor
- Electrical and controls contractor
- Water storage tank contractor
- General/pipeline contractor
- Testing laboratories

### *Inter-Agency Cooperative Agreements*

Potential agencies include but are not limited to the following:

- VUMC
- NTUA
- Navajo County

- IHS
- APS
- State of Arizona
- FEMA
- BIA

## Specific Emergency Response Procedures

Similar to the outlines presented in the previous paragraphs, detailed procedures should be developed for different emergency scenarios and emergency tasks. Specific responses, communications, and resources would be identified and documented for each situation.

***Reports, Forms and Documentation***

A variety of forms and reports should be developed and regularly updated including:

- Notification instruction and documentation
- Hazard and emergency identification
- Call lists
- Messages and action log
- Village and user notifications
- After action report

## Training

Recommended staff training includes regular refresher training on emergency response plans and procedures, and emergency exercises including participation in interagency and statewide simulated emergency exercises. Refresher training should be conducted every six months and emergency exercises held annually.

# 8. O&M Costs

Operating and maintenance costs for the HAMP facilities are estimated using the cost model in the Appendix which shows assumptions and unit costs used in estimating the costs. Actual comparable costs are used where available and appropriate, or assumptions and allowances made for costs that cannot be specifically determined at this time.

O&M costs listed in Table 8.1 are based on full year operation of the HAMP system at an average water production rate of about 198,000 gallons per day. These costs represent initial annual costs, and are expected to vary from year to year.

Estimated annual O&M costs in Table 8.1 do not include initial costs of equipment, tools, etc. or other one-time costs assumed to be supplied under the HAMP construction project or purchased as one-time initial costs.

## Staff Costs

One of the goals of the HAMP is to hire or train operators to the appropriate certification level, and then pay a salary adequate to retain them with the HAMP. Having more competitive salary rates is intended to help attract and retain qualified operators and staff. The current hourly rates paid by the Tribe for similar positions were considered in these estimates. These rates generally are closer to the current market labor rates for similar positions in Northern Arizona.

Proposed labor costs are based on the following hourly rates:

- Senior Operator - $15.00
- Assistant Operator - $12.00
- Utility Manager (HPUA Director) - $25.00
- Administrative - $12.00
- Benefits – 25% of salary

Note that the hourly rate of the HPUA Director reflects an initial salary for HAMP system management only. As the role of the HPUA Director expands to other utility management roles in the future, the salary is expected to increase commensurately, but should not be included in the costs to the HAMP villages except if the service benefits the HAMP villages as well as other Hopi villages.

Organization and staffing requirements are described in Section 9.

## Electrical Power

Electrical power costs are an approximation based on the amount of estimated pumping and allowance for other electrical uses. A representative unit cost of electricity of $0.10 per KWH is used based on the APS rate schedule for water pumping (E-221). Actual power costs are determined by a much more

complicated formula that includes base charges, demand charges, and time-of-day and time-of-year charges.

## Chemicals

The only chemical routinely used is sodium hypochlorite for disinfection at the wells. Other minor chemical usage is included in the Supplies allowance.

## Lab Analyses

Lab analyses shown in Table 4.3 are for annual costs assuming compliance with water quality maximum contaminant limits and related requirements after the first year. More frequent testing is required for the first year to determine that there are no constituents above drinking water standards. The annual costs after the first year assume there are no violations in the first year.

## Vehicle Costs

Vehicles costs include gasoline and routine maintenance estimated at $0.50 per mile.

## Preventive Maintenance

The direct expenses for specialized preventive maintenance and inspection are identified in Table 4.2. These are average annual costs expected to occur beginning about the fifth year of operation. Other preventive maintenance will be performed by operators and included as part of the staff costs.

## Repair Maintenance

Estimated repair costs are identified in Section 4. These are estimated costs for repair and replacement parts and for contractor work such as electrical repair.

## Supplies

This estimate is an allowance for miscellaneous expendable supplies (e.g., rags, gloves, grease, etc.) and for routine equipment parts such as filters, gaskets, etc. used in maintenance and minor repair.

## Contingency

Approximately 10 percent of O&M costs are estimated as a contingency for unknown expenses. This amount can also be used for new capital expenditures, if necessary. Costs in Table 8.1 do not include administrative costs which are listed in Section 13.

*Table 8.1 – O&M Annual Cost Summary*

| Cost Category | Estimated Annual Costs[1] | |
|---|---|---|
| O&M Staff Salaries | $73,000[4] | 2 full time operators, incl. benefits |
| Management/Admin Staff Salaries | $96,000 | HPUA manager and admin staff, incl. benefits |
| Electrical Power | $105,000 | |
| Chemicals | $7,000 | |
| Analytical Costs[2] | $6,000 | |
| Vehicle O&M Costs | $8,000 | |
| Preventive Maintenance Costs[3] | $11,000 | |
| Repair Maintenance | $10,000 | Parts and contractors |
| Supplies | $10,000 | Allowance |
| Contingency | $33,000 | |
| First Year O&M Costs | $359,000 | |

[1]Estimated annual costs for the complete planned HAMP system in 2015. Costs are estimated to increase 2% per year for inflation.
All tools, equipment, and initial supplies are not included and assumed to be supplied in the construction contract.
[2]Lab analyses estimated costs after 1st year. 1st year costs approximately $12,000.
[3]Average annual expenses for preventive maintenance inspection and contractor expense are estimated to begin after about 5 years of operation.
[4]Includes 10% for overtime.

# 9. Organization and Staffing

Initially, several organization alternatives for management and administration of the HAMP system were identified, including:

- Dedicated Utility
- Tribal Utility Department
- Expanded Village Utility Management Cooperative (VUMC)

The Hopi Tribal Council elected to create a dedicated utility organization and passed the Hopi Public Utility Authority and the Hopi Public Utility Commission Establishment Act (Ordinance 60), in May 2013. The ordinance created the Hopi Public Utility Authority (HPUA) for the purpose of managing, operating and maintaining the utility systems of the Hopi tribe, including the HAMP system. The ordinance also established the Hopi Public Utility Commission (HPUC) to regulate the activities of the HPUA and other utilities providing public services within the jurisdiction of the Hopi Tribe. A copy of Ordinance 60 is included in Appendix I.

## Hopi Public Utilities Authority (HPUA)

The HPUA has the authority to provide public services of water, sewer, solid waste, sanitary services, electricity, power, and natural gas to any Village or Village public utility. The initial plan for the HAMP system is to be a wholesale distributor of water to the Villages. Each Village will continue to operate and maintain their own distribution system, unless they specifically request and authorize the HPUA to operate and maintain their Village water system.

HPUA authorities and responsibilities are defined by the Establishment Act, including the following:

- Operate on a self-sustaining financial basis and collect revenue adequate to cover operating expenses, amortization of loans, and appropriate reserves.
- Manage its own finance system including collection of payments, disbursements, and all accounting and auditing operations.
- Make its own budget including an approved capital projects priority list. Major capital projects, greater than $200,000, must be approved by the HPUC.
- Seek funding from any source, including loans, but any grant proposal shall be coordinated with the Tribe's planning and development offices.
- Provide water services, as well as other public services, to any Village or Village public utility as determined by the Village governing body, and can provide water services directly to Village utility users only with a written agreement with the Village.
- Manage, operate, maintain, and repair the HAMP infrastructure, including contracting for maintenance, repair and replacement for capital projects less than $200,000 each.

- Develop and maintain an HPUA Operational Manual.
- A Director will manage the HPUA along with other necessary subordinate staff.

## Hopi Public Utility Commission

The HPUC consists of 7 Commissioners selected and approved by vote of the Hopi Tribal Council. They serve for 4 year terms, but three of the initial Commissioners will serve 2 year terms to create staggered tenures. The Commissioners will elect a President.

HPUC authorities and responsibilities are defined by the Establishment Act, including the following:

- Make regulations and rules governing the HPUA and other public utilities.
- Promulgate a set of regulations to implement the Establishment Act.
- Engage experts to assist the Commission.
- Set the rates, connection charges and other fees by the HPUA and conduct an annual review of rates and fees to determine reasonableness and equity of any charges.
- May set, regulate, or negotiate the rates and charges paid by HPUA for procurement of any utility products and services, or to be paid to HPUA by any public utility or Village utility.
- May select the provider of public utility services to the HPUA.
- Establish its own annual budget, and may request an appropriation from the Tribal Council.

## HPUA Organization

The nature of water utility operation, maintenance and management is a technical business requiring multiple skills and disciplines to be most effective. These disciplines include expertise in the operation and maintenance of mechanical and electrical equipment, chemical analysis and addition, water hydraulics, regulatory requirements, finance and rate making, customer service, community involvement, and others.

The recommended initial HPUA organization should initially include a full-time Director, water system operators, and administrative support staff. Other specific disciplines such as rate studies, legal advice, facility design, audits, and certain types of maintenance are best performed by contractors or through the Tribal organization. The number of staff and estimated staff time needed may be higher at the start of operation and will need to be adjusted in the future depending on actual needs of the HAMP operation and administration.

While this Strategic Plan focuses on organization and staffing for operation and management of the HAMP water system, the role of the HPUA could expand rapidly into other utilities operations, including operation and maintenance of Village water and sewer systems. Recommended staffing will need to change with an expanded HPUA role.

## HPUA Director

The utility will need a full-time Director to perform and direct the many requirements and duties for managing and administering the utility. The manager will need to have capabilities to manage the organization, business, and technical issues and requirements that regularly arise in the operation and management of the HAMP system.

Typical duties and responsibilities of the manager include the following:

- Hiring, maintaining, and managing staff
- Accounting, budgeting, billing, and financial management
- Regulatory agency requirements, compliance, and communication
- Rate and fee development
- Customer service and Village relations
- Coordination and communication with outside agencies
- Operations and maintenance planning and oversight
- Operating and administrative procedures
- Monitoring performance of the water system
- Information and records management
- Addressing legal issues and requirements
- Purchasing and contracting
- Technical and engineering support
- Liaison and support to the HPUC
- Backup to the O&M staff
- Emergency planning and response

The Director should have 5 to 10 years of experience in water system operation and management. Demonstrated financial management capabilities, including budgeting and rate setting, and communication skills are key areas. A Grade 3 water distribution operator or higher is highly desirable since the manager may also need to be the operator in responsible charge of the system.

An example position description is included in Appendix E.

## O&M Staff Requirements

Initial recommendations for the staff required for the regional system are developed based on the operating and maintenance requirements and tasks identified in Section 4. These recommendations will need to be reconsidered after start-up and operation of the system and determination of actual operation and maintenance needs. However, adequate operating staff should be in place before the

end of construction to take advantage of start-up experience and equipment manufacturer training. The first year of operation of a new system tends to be time consuming as operators learn the system and operation, and as new procedures are developed, implemented and revised.

The size and importance of the regional water system dictate the need for dedicated system operators to maintain a reliable water supply to the Villages. Table 4.1 indicates there must be at least one full time operator for routine operation and maintenance. The preventive maintenance requirements in Table 4.2, along with repair maintenance, add a minimum of an additional half time operator. Considering staff time off, two full time operators are recommended for initial operation and maintenance of the HAMP facilities.

There should be at least one skilled, knowledgeable senior operator to perform critical operations and maintenance tasks and make daily operating decisions. Considering the remote location of most of the system and emergency requirements, a second operator or technician is also recommended for back-up tasks requiring two people, and for safety. These operators will conduct the routine operation and monitoring of the system, basic maintenance and repair tasks, and emergency response. Both operators should be trained in the operation of the system including specific training in equipment maintenance and repair.

***Operator Skills and Qualifications***

The HAMP water system requires the equivalent of a Grade 2 certification in the State of Arizona which is consistent with the national Association of Boards of Certification classifications.

The senior operator should have experience and at least a Grade 2 Water Distribution Operator Certification as issued by the State of Arizona or the Inter-Tribal Council of Arizona Tribal Water Operator Certification Program.

Specific experience and skills of this individual should be in the following basic areas of water system operation:

- Well operation and maintenance
- Water system hydraulics
- Pipeline and valve repair
- Water quality testing and regulatory requirements
- Chlorination
- Pumps, motors, and equipment operation and maintenance
- Basic electric and control system functions
- Safety hazards and procedures

Other attributes include the ability and willingness to respond to emergencies and to be conscientious and responsible for the safety and reliability of the water supply to the customers. An example of a Grade 2 operator description is included in the Appendix E.

The second operator may have a Grade 1 certification or equivalent experience in equipment operation or equipment maintenance. A good complement to the senior operator would be for the second operator to have stronger skills and experience in equipment maintenance.

### *Administrative Staff*

The HPUA should have dedicated administrative staff to manage the records, accounting and bookkeeping, purchasing, correspondence, and other daily tasks required for management and administration of the system and the HPUA organization. This position will need to be full-time initially to set up records, accounting and billing systems. Depending on the future operations, including the management of one or more Village water systems, additional administrative staff may be needed.

Administrative staff should have typical skills and capabilities with computers, including word processing and spreadsheets, and with financial bookkeeping, records management, and written and verbal communication.

## VUMC

The VUMC is currently an equipment-sharing cooperative of several Villages. Equipment, such as backhoes and dump trucks, is owned by the VUMC or each Village, and a cooperative agreement provides for sharing this equipment and the costs.

The VUMC was originally chartered in 1996 as a 501C3 (non-profit) organization as a consolidated utility for the participating member Villages. The original utility provided operating staff and services including managing the Village systems. A governing Board was appointed by the Villages and the Tribe initially provided funding for the VUMC operations.

However, by 2001 member Villages elected to drop out of the organization and remove their funding. As a result, the VUMC became a more informal cooperative to share equipment resources among participating Villages.

The VUMC is a potential alternative for operation and maintenance staffing of the HPUA. VUMC members could supplement the HPUA O&M staff and reduce the recommended HPUA full-time operator staffing from two to one by providing back-up and a second operator from the Village systems. Initially, at least one HPUA experienced operator is recommended until the operation has stabilized.

The HPUA could also participate with the VUMC in heavy equipment sharing, including backhoes and dump trucks, as well as other specialty equipment. This could minimize the use of outside contractors as well as strengthen the operation and maintenance capabilities of the Village water systems.

The VUMC is not specifically included in the Strategic Plan due to the need to discuss and negotiate cooperative opportunities and agreements between HPUA, VUMC, and the Villages. The HPUA Director should consider inclusion of the VUMC in planning and developing the organization and operation of the HAMP system.

## Training Plan

Training is an essential part of developing and sustaining a new utility organization for the HAMP system. This training includes becoming familiar with the HAMP facilities and operations as quickly as possible to enable reliable operation and water service as soon as possible at the end of construction. In addition, training for the HPUC Boardmembers is essential to their understanding of the technical and business requirements and responsibilities of the utility system and organization.

There are many sources of training available including the Inter-tribal Council of Arizona Technical Assistance and Training Program, Rural Community Assistance Corporation, American Water Works Association, EPA and many water utility seminars and workshops conducted on a regular basis by agencies and others throughout the state.

There is a good amount of computer-based training available also that allows self-paced training. Professional trainers are also an option for more intense and customized on-site training for an entire staff as needed at start-up or for follow-up training.

Training requirements from equipment manufacturers and start-up engineers should be part of the HAMP construction contracts. This training should be directly related to equipment manuals, water system O&M manuals, and other procedures developed during the construction phase.

Specific on-going programs for training and developing operators and advancing their operator certifications are necessary to provide and retain qualified staff.

Some recommended key training subjects are identified in the following outline in a general time line.

## Operator Training

***Before start-up***

- HAMP system overview and operating procedures
- Equipment operation and maintenance
- Regulatory requirements, sampling and reporting
- Record keeping
- Safety
- Emergency response procedures

***After start-up and on-going***

- Water system fundamentals (e.g. math, chemistry, hydraulics)
- Laboratory and sampling procedures and operator testing
- Asset management practices
- Maintenance management

- Certification exam preparation
- Safety
- Emergency response review and exercises
- Computer and control systems

## Management and Administrative Staff Training

### *Before start-up*

- System overview and service performance measures
- Financial practices and accounting
- Regulatory requirements
- Emergency response
- Computer systems

### *After start-up*

- Personnel management
- Communication skills and procedures
- Contract preparation and management
- Project management

### *HPUC Training*

- System overview and service performance measures
- Policy making and Board roles and responsibilities
- Financial requirements and systems
- Regulatory requirements

# 10. Rules, Regulations, and Policies

The HPUA and HPUC Establishment Act (Ordinance 60) require the HPUC to develop rules and regulations for the HPUA and other utilities, but are not specific on what is included. The HPUA Director and the HPUC will need to work together to establish rules, regulations, and policies for management and control of the HAMP system as well as management and control of the HPUA organization. This section outlines rules and regulations categories typically utilized by public water utilities. This is not an all-inclusive list, and should be considered guidance for the HPUA Director and HPUC in their development of appropriate rules and regulations.

The rules and regulations for a water system are generally codified in an ordinance or similar legal document that should be approved and adopted by the HPUC. This ordinance compiles all the relevant regulations and policies in one location, and requires HPUC approval of any revisions.

In addition to the rules and regulations governing the HPUA, the HPUA will need to have polices, standards, and regulations governing the use and operation of the HAMP system. The HPUC will need to decide which of these regulations proposed by HPUA must be approved by the HPUC.

***Scope and limits of HPUA services and HPUA Director***

- Definition of service obligations to the Villages and similar responsibilities of the HPUA including service level objectives and performance measures.
- Clarification to limits of liabilities and responsibilities of the HPUA and Director.
- Policies restricting individual service connections to the HAMP system, and unauthorized use of water.
- Policies and procedures for expansion of the HAMP system and for connections outside of the initial HAMP system.

***Water use charges and rates***

- Basis and description of water usage rates and other user charges.
- Policies for updating and approving rate changes.
- Policies on resale of water to users, and specifically to users outside of participating Villages.
- Metering and rate policies and procedures for temporary connections or truck loading stations.

***Village meters***

- Policy of metered use as basis for billing Villages and users.
- Standards and schedule for maintaining meter calibration and verification.
- Policies for disputes of Village water usage.

### *Financial Policies*

- Definition of the use of funds and reserves, limiting to specific dedicated uses and reserve ceilings.
- Policies for account management and approval of disbursements.
- Policies and approvals for necessary transfer of funds between fund accounts.
- Purchasing policies and requirements.
- Policies and authorized enforcement actions for non-payment of fees.
- Budget approval process, schedule, and required budget information.
- Requirements for annual audits of HPUA.

### *Protection of facilities, equipment, and groundwater wells*

- Restricting unauthorized access, use, or damage to HPUA facilities and equipment.
- Restricting development and certain activities in the vicinity of groundwater wells.
- Requirements for backflow prevention for permanent or temporary connection.

### *System design standards*

Standards for pipe, valves, and equipment, as well as design and construction standards, are recommended to provide guidance for design and construction contractors, as well as consistency of equipment and materials within the HPUA systems.

- Requirements for extension of the HAMP system including design submittals and approval processes.

## Administrative Policies and Procedures

Administrative policies include procurement policies and procedures, and human resource policies and procedures. The WSSP assumes that the HPUA will generally follow existing Tribal policies and procedures except as noted. The administrative procedures reflect an independent organization supported by other Tribal administrative functions and departments as appropriate.

### *Procurement Policies*

Procurement policies and procedures are recommended as a separate function for the HPUA. This is due to the nature of the continuous O&M work, and the need for daily or ongoing purchasing required to ensure the availability of materials and services needed for reliable water delivery. There is a need for rapid purchase of routine and emergency materials and services, as well as timely procurement of construction and service contractors for repairs and upgrades. In addition, the HPUA is required to be financially self-sustaining.

The following specific procedures and functions for the HPUA should be established, and coordinated with the Tribal procedures as appropriate.

- Purchasing authorization and tracking.

- Requirements and procedures for bidding.
- Development and management of contracts for services.
- Development and management of contracts for construction and professional services.
- HAMP administrative staff duties and responsibilities.

### *Human Resource Policies*

The HPUA should generally follow Tribal human resources policies which includes compliance with federal labor standards and requirements. Specific exemptions to the tribal policies and procedures would include establishing appropriate salaries to attract and retain qualified operators and an experienced utility manager. Specific human resource policies and programs for the HAMP organization include the following:

- Salaries and benefits program and policies.
- Job descriptions.
- Fair employment practices.
- Federal regulatory requirements.
- Performance standards and evaluation programs.
- Disciplinary policies.
- Recruiting and hiring practices.
- Counselling and employee assistance.

### *Customer Service and Relations*

The number of customers for the HAMP system is initially limited to the Villages of Polacca (First Mesa Consolidated Villages), Shungopavi, Sipaulovi and Mishongnovi. However, there will be ongoing communication and interaction with the Village representatives on billing, future water supply planning, water service levels, and also for Village user questions and complaints.

- Phone numbers for routine and after-hours calls and complaints should be established and distributed.
- Procedures for user complaints should be established for appropriate responses and to track responses and trends, particularly for water quality. A user compliant form should be used for all Village or user issues and complaints.
- Level of service standards such as pressure, minimal water flow, and water quality should be established and measured at least weekly at each Village meter connection.

# 11. Records and Reporting

Detailed forms and templates will need to be developed for a variety of records and reports associated with operation and management of the HAMP system. The following is a general summary of some of the more important records and reports but there may be others that will need to be developed depending on how the HAMP system is constructed, the utility organization, and funding agency requirements.

It is highly desirable for records and reports to be compiled on a computer, with suitable back-up capability. This allows for evaluation of the information and for easier access, compiling, and tracking of utility information.

### Monthly Operation Reports and Records

A record of daily operating data such as inspection reports and checklists, equipment meter readings, well production, water volume delivered to Villages, power used, chemicals used, and significant events will be recorded and compiled. These records should be generally summarized into monthly reports that provide history and trends of operation information.

### Monthly Maintenance Reports and Records

A compilation of routine maintenance tasks performed as scheduled, along with maintenance and inspection findings, equipment problems and failures, repairs and replacements, and staff time, parts, and materials used should be recorded daily or as they occur. Maintenance activities are typically tracked with work orders. A formal work order system is not necessarily needed for the HAMP system if there is an appropriate alternative form for tracking this information.

### Management Reports

Management reports can take many forms depending on the structure of the organization and relationships with outside agencies. Some examples include:

- A summary of activities and financial performance for the governing Board.
- Evaluation and analysis of system performance and comparison to service level objectives.
- Records of Village or user complaints for water quality or pressure.
- Regular reports or newsletters to the HAMP system users, in this case the Villages.

### Regulatory Reports and Compliance

- Quarterly reporting of required analytical results unless exceedances of MCLs are detected.
- Records and responses for MCL exceedances, including regulatory agency notification forms and documentation will need to be developed and maintained.

- Annual Consumer Confidence Report (CCR).

## Financial Reports

There are a variety different financial reports to be utilized depending on funding requirements and financial agency requirements. These reports are generated from accurate accounting and financial transaction data and records. Financial records and reports include:

- Accounting records.
- Monthly financial reports of expenditures and revenues.
- Monthly fund balances and transaction reports.
- Annual financial reports.
- Annual audit by outside professional accounting firm or certified public accountant (CPA).

## Budget

The HPUA will be required to present an annual budget to the HPUC for approval of expenditures and rates. This will require preparation of budget documents describing the expenditures and providing justification.

## Grant/Loan Compliance Reports and Records

Annual audits by grant and loan agencies are anticipated and will be defined by the agencies.

## Capital Project Records and Reports

A system of records will be needed for tracking the cost and progress of capital projects, including the HAMP project. These records will include budget amounts and cost estimates, categories and expenditures to contractors and others compared to budgets and records of project changes and approved change orders.

## System Plans and Records

- Equipment Technical Manuals and Specifications.
- Construction Record Drawings and Specifications.
- O&M manual and procedures.

## Property and Equipment Records

- Legal descriptions and records of ownership.
- Vehicle records including titles, registration, insurance certificates, etc.
- Equipment records as part of an asset management program.

- Insurance policies and records.

### Legal Documents

- Charter and by-laws
- Rules and regulations
- Ordinances
- Contracts and agreements

### Contracts

- Records and files for contracts with outside support contractors.
- Construction contract records require a separate dedicated system due to the expected size of documents and records associated with construction projects.

### Personnel Records

- Personnel policies and forms
- Employee records
- Federal government reports as required

# 12. Risk and Insurance

The following is a summary of major risks and potential consequences to the HAMP system and personnel. The list is not all inclusive but includes many common types of risk for a public water utility.

*Significant damage to facilities*

- Loss of water service.
- Cost to repair or replace.
- Property and utility damage caused by water flooding or erosion from pipeline break.

*Personnel injury, disability, or death*

- Potential liability from staff or others outside the organization.
- Loss of experienced staff.

*Water contamination*

- Risk to users health.
- Regulatory violation and potential fines.
- Difficulty and cost to find and correct.

*Loss of/inadequate revenue, including failure of the Villages/other users to make required payments*

- Inability to pay expenses.
- Increased needs and costs of borrowing.

*Loss of business continuity*

- Inability to manage or pay expenses.
- Loss of financial tracking and control of costs.
- Loss of regulatory reporting data.
- Costs of replacement.
    - Destruction of electronic or paper records due to fire, flood, theft, etc.
    - Loss of manager or turnover of staff.

*Breach of contracts*

- Legal action including financial damages and costs.
- Loss of reputation.

Litigation

Legal action against the HAMP for a variety of reasons.

## Risk Mitigation and Contingency Plans

If potential risks are identified, the organization can mitigate or reduce those risks, or have plans in place to respond to the risks and mitigate the consequences. Among the actions and strategies for the HPUA to reduce risk and its resultants costs are the following:

- Staff training and awareness.
- Backup and contingency plans for emergencies and other potential risks.
- Manager oversight.
- Regular risk assessments and updated controls and mitigation plan.
- Requirements and policies for enforcing non-payment of water system fees.

## Insurance Coverage

Insurance coverage for the HPUA system, staff, and operations may require specific coverages not currently provided by the Tribe. Insurance coverage and the level of coverage will need to be determined based on the costs of the insurance and the appropriate level of coverage. Deductibles and self-insurance are a consideration in any decision depending on the potential risks the HPUA wants to assume. Due to the large range of coverages and other factors, an appropriate insurance program will need to be developed through a qualified broker or agent and the insurance premium costs identified. Insurance for the HAMP system may be provided under existing Tribal policies but should be carefully reviewed and may need to be adjusted for the specific requirements and risks of the HPUA.

The following are potential insurance coverages that can be considered to cover the costs and risks identified above.

- Workers compensation.
- General liability.
- Personal liability for HPUA director and appropriate staff.
- Vehicle damage and liability.
- Property and building damage or replacement.
- Equipment damage (boiler and machinery).
- Workers medical coverage.
- Workers disability and life insurance.

# 13. Organization and Administrative Costs

In addition to the O&M costs identified in Section 8, there are costs associated with the management and administration of the system and the utility organization. Some of these costs are required during the initial formation of the HPUA, but most will continue into the future to support the O&M and administration of the system.

*Tribal Administrative Fee*

The ordinance establishing the HPUA requires the HPUA to pay an administrative set-aside fee equal to 5 percent of the gross revenues of the HPUA. This fee is intended to cover the costs borne by the Tribe for services by the Tribal Departments.

*Accounting and billing system*

Depending on the accounting system chosen, there will be costs associated with establishing a code of accounts and purchase of software or costs for use of the Tribe's accounting system. This could include additions and revisions to the existing Tribal accounting system as well as bank accounts. It may also include financial, risk and procedural audit by a contracted CPA firm.

*Permits and regulatory activities*

There are costs for permits and fees associated with establishing the HAMP system and HPUA and for ongoing operation. This would also include expenses of meetings and conferences with regulatory and support agency representatives such as EPA.

*HPUC activities*

It is anticipated that the HPUA will need to perform administrative tasks related to HPUC regulation including budget presentations and rate development studies.

*Training and conferences*

Recommended training is identified in Section 9. Training on the HAMP system and equipment will initially be provided as part of the construction contract. Ongoing training of operators and the manager is a necessary element of successful utility operation. Attendance at conferences and workshops for the manager and staff is expected.

*Administration meetings and activities*

For example, meetings with HPUC, IHS, the Villages, BIA, tribal departments, and similar activities may require travel and meeting preparation costs.

*Insurance*

Insurance for the HPUA HAMP system and operations is discussed in Section 13. These costs can vary widely depending on the types and levels of coverage selected. Also, some insurance can be added to existing tribal insurance coverage, such as workers compensation, but there may be some cost increases associated with the additional coverage. Some risk coverages for the water system may be different for the water system and require supplement policies or riders if added to existing Tribal insurance coverage. Insurance premiums can vary from $5,000 to more than $50,000 for similar size water utilities. An initial allowance of $15,000 is assumed.

*Computer and office equipment operation maintenance*

Service expenses for computer hardware and software maintenance, copier and printer expenses, and similar equipment costs for operation and ongoing maintenance will be incurred.

*Telephones and radio expenses*

Monthly charges for telephones and computer internet connections as well as licenses for the radio system are other potential administrative costs.

*Postage and reproduction*

This includes internal costs of copying and production of reports as well as commercially produced documents such as brochures, annual consumer confidence reports and similar reports.

*Legal support*

Expenses for tribal Legal Counsel's office are anticipated to be covered by the administrative set-aside fee identified above. Specialized outside legal support may be needed depending on legal requirements and capabilities of Tribal legal department staff.

Other administrative charges of the Tribe for support services to the HAMP utility

Some of these costs include support during establishment of the HAMP and enterprise department by other tribal departments and staff.

This also includes labor and expenses from support departments such as the legal office, water resources, and human resources.

### *Estimated organization and administrative costs*

Table 13.1 provides an estimate of costs or initial allowance associated with the administrative activities identified above. These costs are approximate and are expected to vary widely from these estimates. They will need to be refined as the HAMP utility organization and staff are developed, and specific requirements and associated expenses defined. These estimated costs are approximately 10 percent of the direct O&M costs. Depending on when the HAMP utility organization is established, the staff costs and expenses from the Tribe could be higher than indicated here if the existing Tribal staff are required to develop and implement the HAMP utility organization.

### *Table 13.1 – Estimated Organization and Administrative Budget*

| Activity | Estimated Annual Expenses |
|---|---|
| Tribal Administrative Set-Aside | $30,000 |
| Accounting and Audits | $ 3,000 |
| Permits and Fees | $ 2,000 |
| Training and conferences | $ 3,000 |
| Meetings and activities | $ 3,000 |
| Insurance | $15,000 |
| Computer and office equipment | $ 2,000 |
| Telephones and radio | $ 1,000 |
| Postage and reproduction | $ 1,000 |
| Legal Expenses | $ 5,000 |
| Miscellaneous administrative expenses | $ 3,000 |
| Contingency (10%) | $6,000 |
| **Total estimated annual costs** | **$71,000** |

# 14. Financial Plan

The financial plan is intended to identify estimated costs and revenues to sustain the HAMP water system. ***The costs presented in this section should be considered preliminary for planning and decision making purposes only, and not relied upon for any other purpose. They are based on multiple assumptions and limited information at this stage of HAMP implementation. While costs have been estimated to be conservative, there are many unknowns that can increase or reduce these estimated costs.***

### *Capital Costs and Funding*

Funding for the HAMP construction is expected from several sources including federal and state grants and loans, user fee revenue, and Tribal funds. The amount and source of funds for the HAMP project construction have not been committed at the time of this plan. The amount and sources of the funding that will be finally authorized could impact the HAMP project facilities, phasing, and/or cost allocation to the Villages.

The USEPA has provided grants for planning and studies for the HAMP, including groundwater evaluation, the preliminary engineering report, and strategic planning. They have also provided funds for a limited amount of assessment including well installation. To date, the EPA has provided about $5.1 million in grant funds. IHS has provided additional funding of about $1.15 million for work to date in planning and assessment.

The majority of construction funds are expected to be provided by the US Department of Agriculture-Rural Development grant and loan. The USDA can provide a grant of up to 75 percent of the project costs, but that is inclusive of other federal grants. The remainder of the construction funds would then be provided from USDA-RD loans and the Hopi Tribe or other sources. There may be other sources of grants and loans including the Indian Health Service, US Department of Housing and Urban Development (HUD), Water Infrastructure Financing Authority of Arizona (WIFA) and others, not yet specifically identified.

A resolution has been introduced for consideration by the Hopi Tribal Council to provide a grant of $2,179,000 to the Hopi Public Utility Authority for support of HAMP construction and implementation of the HPUA and HPUC. These Tribal funds have not yet been committed but are included in the financial analysis, along with an additional $71,000 of unidentified Tribal or other financial support.

A USDA-Rural Development (RD) loan is anticipated to pay for the portion of the capital costs not otherwise funded by grants and Tribal contributions This loan must be repaid by the water system users, typically over a 40 year term. USDA-RD loans can be for up to 25 percent of the unfunded capital costs but actual loans may be based on the average user's ability to pay the monthly cost of both O&M and loan repayment, along with other factors.

The interest rate and the amount of the loan from USDA-RD may vary depending on when the funds are allocated and other conditions. As of the date of this plan, the interest rate on the USDA-RD loan

is 2.5%, but this interest rate changes quarterly, and can vary up to 4.5 percent. The term of the loan will be 40 years.

The estimated capital costs include work for planning, designing, constructing, and starting the HAMP water system. They are identified in the PER and total $16,914,000 for work not already completed and funded. Table 14.1 lists the estimated total capital costs along with the anticipated funding sources.

***Table 14.1 – Estimated Capital Costs***

| | Capital Costs |
|---|---|
| Capital Cost | $16,914,000[1] |
| Estimated USDA-RD & Other Grants (75%) | $12,685,000 |
| Capital Cost to be Funded | $4,229,000 |
| Hopi Tribal Council Grant | $2,179,000 |
| Other Financial Support | $71,000 |
| Estimated USDA-RD Loan Amount | $1,979,000 |
| Annual Loan Repayment Amount | $79,000[2] |
| [1] Project capital costs to be funded as of June, 2014<br>[2] 2.5%, 40 years | |

**Operating Costs**

Operating costs include the costs to operate and maintain the HAMP system, along with HPUA administrative costs related to the HAMP system. The O&M costs are developed and described in Section 8 and administrative costs are described in Section 13.

The estimated total annual operating costs in Year 2015 are summarized in Table 14.2. These costs are expected to increase in the future with inflation and increased water usage.

***Table 14.2 – Estimated Annual Operating Costs (Year 2015)***

| Cost Category | Estimated Annual Costs |
|---|---|
| Operation and Maintenance (Table 8.1) | $359,000 |
| Administration Costs (Table 13.1) | $71,000 |
| **Annual Operating Costs** | **$ 430,000** |

**Replacement and Rehabilitation Costs**

R&R costs are developed and described in Section 3. They include an annual contribution to an R&R reserve fund to pay for scheduled equipment and asset rehabilitation and replacement though the 20 year life of the project. The R&R annual contribution is based on future or inflated costs of replacement, and equalized over the 20 year period, so it is not inflated annually. The annual contribution should be revised if assets are added or removed, or if the estimated expected lives or cost estimates change.

***Table 14.3 – Replacement and Rehabilitation Costs***

**Total Cost**

| | Annual Cost |
|---|---|
| Annual Contribution for Rehabilitation | $25,000 |
| Annual Contribution for Replacement | $25,000 |
| Total Annual R&R Contribution | $50,000 |

**Annual Allocation**

Estimated total annual costs are summarized in Table 14.4 and are allocated to the Villages to initially identify potential Village costs. The initial allocation is based on estimated water usage in 2015 as identified in the PER and summarized in Table 14.5. Some numbers are rounded for simplicity. Estimated cost per connection is calculated based on the estimated number of connections in 2015 listed in Table 14.5.

***Table 14.4 – Estimated Total Annual Costs***

| Cost | Estimated Annual Cost, Year 2015 |
|---|---|
| Loan Repayment | $79,000 |
| Operation and Maintenance | $359,000 |
| Administrative | $71,000 |
| Replacement and Rehabilitation | $50,000 |
| **Total Annual Cost** | **$559,000** |

***Table 14.5 – Estimated Village Connections and Water Usage (Year 2015)***

| Village | Estimated Number of Connections | Estimated Water Usage gpd |
|---|---|---|

| | | |
|---|---|---|
| FMCV | 642 | 142,000 |
| Shungopavi | 154 | 30,000 |
| Sipaulovi/Mishongnovi | 139 | 26,000 |
| Total | 935 | 198,000 |

Table 14.6 shows the allocation of estimated total costs to the Villages, including the average cost per connection, based on estimated usage. Table 14.6 is provided for information only. The proposed costs to the Villages are further defined later in this section based on the initial user fees.

***Table 14.6 – Total Initial Cost Allocation***

| Village | Total Annual Cost | Monthly Cost/Connection |
|---|---|---|
| FMCV | $ 401,000 | $52.05 |
| Shungopavi | $ 85,000 | $46.00 |
| Sipaulovi/Mishongnovi | $ 73,000 | $43.76 |
| Total/Average | $ 559,000 | $49.82 |

## User Fees

Users of the system, whether the Villages or other institutions such as schools, must provide the revenue to pay for the annual costs identified in Table 14.4, as well as some reasonable reserve funds. Grants and loans from government agencies will not pay for the ongoing O&M and administrative costs of the water system.

Rate making for water utilities can be a complex undertaking. For the HAMP, the system design generally assumes relatively uniform average usage and peak demand based on number of connections and estimated population. The PER and WSSP also assume that water will be delivered to the Villages, who will continue to provide service and bill the users within the Village. The water to each Village or institution will have a master meter to measure the volume of water used every month.

The goal of the user rates at this point is to provide an initial approach that is fair, readily understood, and easily implemented. Estimated charges to the Villages will also be used to determine the potential costs to the individual users based on the estimated number of connections, but the Villages may elect to use Village funds rather than just individual user fees. More sophisticated rate structures can be developed after the first few years of operation and experience with usage. This sophistication may include changes in the ratio of base charges and usage charges, demand or extra capacity charges, increasing block usage rates or different rates for different types of customers, most notably commercial users and schools or other institutions.

There are usually two major rate components for consumer water rates:

1. A base fee that does not vary with the amount of water used, and
2. A usage fee that is based on the amount of water used.

Since the rate structure for charges to the Village does not need to consider individual user rates, the rate structure to the Villages can be simple. The base rate can include capital costs and other fixed O&M costs such as administration and personnel salaries that typically do not vary with the amount of water used.

***Base Fees***

The base fee calculation for the HAMP system includes those costs not expected to change as water usage changes, also called the fixed costs. They include the capital or loan repayment, administrative costs, rehabilitation and replacement contributions, and salaries and analytical cost portion of the O&M costs as identified in Table 8.1. Administrative costs are identified in Table 13.1.

The fixed costs are summarized in Table 14.7 as base fee components, including an average base fee cost per connection. The base fee is the cost to be paid by the Villages regardless of how much water is used in each month. It should be adjusted annually based on the actual usage for the previous year.

***Table 14.7 – Base Fee Cost Components***

| Base Fee Cost Components | Annual Cost |
|---|---|
| Loan Repayment | $ 79,000 |
| Administrative Costs | $ 71,000 |
| R&R Contribution | $ 50,000 |
| Salaries | $169,000 |
| Analytical Costs | $6,000 |
| **Total Base Fee Costs** | **$375,000** |
| Equivalent Monthly Fee per Connection | $33.42 |

The equivalent monthly fee per connection in Table 14.7 is provided for information. The base fee rate in Table 14.7 will be allocated to each Village based on their proportion of the estimated total water usage for the prior year. Initially, this is equivalent to the number of connections since estimated usage is based on the number of connections. The number and type of connections is a more traditional method of allocating base costs. However, the number of connections in each Village is difficult to determine initially, and in the future, since HAMP is a wholesale system delivering water to the Villages. Therefore, annual water usage is recommended to be used to allocate the base costs

every year. A more accurate system of determining and verifying the number and type of connections in each Village might be developed in the future.

### *Usage Fees*

Usage fees are based on variable O&M costs that are listed in Table 14.2. These costs are derived from Table 8.1. The O&M costs are divided by the total estimated usage identified as approximately 198,000 gallons per day in Table 14.5. This usage is fee is for the first year of operation.

***Table 14.8 – Usage Fee Cost Components***

| Usage Fee Cost Components | Annual Cost |
|---|---|
| Electrical Power | $105,000 |
| Chemicals | $7,000 |
| Vehicle O&M Costs | $8,000 |
| Preventive Maintenance Costs | $11,000 |
| Repair Maintenance Costs | $10,000 |
| Supplies | $10,000 |
| O&M Contingency | $33,000 |
| **Annual O&M Costs Allocated to Usage Fee** | **$ 184,000** |
| Usage Fee per 1000 gallons | $ 2.55 |

### *Other Revenues*

As the ultimate owner of the HAMP system, the Hopi Tribal Council may elect to contribute to funding the operating costs of the system to reduce the costs to the Villages and the individual users. The requirement for funding may be a provision of the USDA-RD grant and loan to reduce the individual user cost. The Tribal contribution may be in the form of grants, direct payments, loans, or annual subsidies. This revenue has not yet been discussed as an option for the HAMP.

## Fund Reserves

Good financial practice includes maintaining adequate or required reserves. Reserves are amounts needed to cover unforeseen circumstances such as lack of payment, reduction in water usage, and unexpected or extraordinary expenditures. Other than the R&R reserve funds, reserve amounts have not been specifically included in the estimated initial costs and financial projections to reduce the financial impact during the first years of operation.

The projected revenue may exceed the estimated costs and provide excess funds that could be retained as reserves. Contingencies are included in all the cost estimates so the financial projections are considered conservative. Reserves contributions may be added to the budgets and increased over time based on future experience with actual costs and revenues.

### *Debt Payment Reserve*

USDA-RD loan requirements include a requirement that the utility maintain a reserve of 10 percent of the annual loan payment in reserve which is to be built up over the first 10 years of the years of the loan. This reserve would be approximately $7,900.

### *O&M Reserve*

A cash flow reserve of 3 months of operating expense is typically recommended for utilities to provide any potential lag between billing and payment. Billing should be monthly to provide sufficient cash flow for ongoing O&M expenses, but in event of non-payment or extraordinary expenses, the reserve will allow the utility to continue to pay the ongoing expenses such as salaries, power, and chemicals for a short period of time. This reserve would be approximately $107,000 and would need to be built up over several years, depending on the availability of funds.

### *R&R Reserve*

Rehabilitation and replacement costs were calculated and identified in Section 3. These costs are based on the estimated schedule and costs of R&R in the future and converted to equal annual payments. This annual payment approach avoids having insufficient funds in any year for major R&R. This fund should build-up the first 5 years before R&R tasks are required and then gradually level out as more R&R work is performed in the future. The annual payment will need to be adjusted to avoid building up too much or too little reserve. Recommended R&R fund reserves should be between $300,000 and $500,000 based on initial estimates, and should be achieved and maintained within the first 10 years of operation. Evaluation and review of the R&R and fund balance should be made annually.

## 10 Year Cost and Revenue Projections

Total HAMP system costs are estimated for the year 2015 in Table 14.4 and then projected based on 2 percent annual inflation. O&M costs for power and chemicals are increased an additional 1.8 percent per year, in addition to inflation, for increased water production costs for increased water usage. For this analysis, it is assumed the annual increase in water usage results from an increase in the number of new connections, rather than an increase in water usage per connection. Therefore, the number of connections, as well as the water usage, will increase at an estimated rate of 1.8 percent per year.

The 10 year projected costs and revenues are listed in Table 14.9. The revenue projections are based on the following initial proposed fees:

**Base fee**: Base fee costs are allocated to each Village based on the initial estimated usage as follows:

| | |
|---|---|
| FMCV: | 71.7% |
| Shungopavi: | 15.2% |
| Sipaulovi/Mishongnovi: | 13.1% |

**Usage fee**: $2.55 per 1,000 gallons of water used

The base fee revenue will increase in accordance with increases in the base or fixed cost components. The usage fee is increased an average of 1 percent per year for this analysis to provide adequate revenue for operating or variable costs increases resulting from inflation and increased usage in the future.

This fee structure and the fees are anticipated to change after the HPUA and HPUC organizations are established. Overall water rates should be dependent on the costs of service, but the rate structure, such as base fees versus usage fees, are often based on social and political considerations.

***Table 14.9 – 10 Year Total Cost and Revenue Projection***

| Year | Base Costs | Usage Costs | Total Costs | Total Revenue |
|---|---|---|---|---|
| 2015 | $375,000 | $184,000 | $559,000 | $559,000 |
| 2016 | $380,000 | $190,000 | $570,000 | $571,000 |
| 2017 | $385,000 | $196,000 | $581,000 | $583,000 |
| 2018 | $390,000 | $202,000 | $592,000 | $596,000 |
| 2019 | $395,000 | $208,000 | $603,000 | $608,000 |
| 2020 | $400,000 | $215,000 | $615,000 | $622,000 |
| 2021 | $406,000 | $221,000 | $627,000 | $635,000 |
| 2022 | $411,000 | $228,000 | $639,000 | $648,000 |
| 2023 | $417,000 | $236,000 | $653,000 | $662,000 |
| 2024 | $423,000 | $243,000 | $666,000 | $677,000 |
| 2025 | $429,000 | $251,000 | $680,000 | $691,000 |
| Total Revenue is projected using base fee revenue that increases with base fee costs, and usage fee revenue based on increased water usage and a 1 percent per year increase in the usage fee rate. | | | | |

The annual costs for each Village for the 10 year planning period are listed in Tables 14.10 thru 14.12. The monthly base charge to each Village is calculated based on the proportion of total usage which is assumed to stay the same through the 10 year period for these estimates. The base fee allocation to each Village will need to be adjusted annually based on actual usage for each Village. The usage fee is based on the estimated usage in Table 14.5, increasing 1.8 percent per year. Note that there are some minor differences between the total revenues from each Village in Tables 14.10 through 14.12, and the total projected revenue in Table 14-9 due to rounding the estimated costs and revenues to the nearest $1,000.

***Table 14.10 – FMCV Projected 10 Year Budget***

| Year | Base Fee | Usage Fee | Total Annual |
|---|---|---|---|

| | | | Cost |
|---|---|---|---|
| 2015 | $ 269,000 | $ 132,000 | $ 401,000 |
| 2016 | $ 273,000 | $ 136,000 | $ 409,000 |
| 2017 | $ 278,000 | $ 140,000 | $ 418,000 |
| 2018 | $ 283,000 | $ 144,000 | $ 427,000 |
| 2019 | $ 288,000 | $ 148,000 | $ 436,000 |
| 2020 | $ 294,000 | $ 152,000 | $ 446,000 |
| 2021 | $ 299,000 | $ 156,000 | $ 455,000 |
| 2022 | $ 304,000 | $ 161,000 | $ 465,000 |
| 2023 | $ 310,000 | $ 165,000 | $ 475,000 |
| 2024 | $ 315,000 | $ 170,000 | $ 485,000 |
| 2025 | $ 321,000 | $ 175,000 | $ 496,000 |

***Table 14.11 – Shungopavi Projected 10 Year Budget***

| Year | Base Fee | Usage Fee | Total Annual Cost |
|---|---|---|---|
| 2015 | $ 57,000 | $ 28,000 | $ 85,000 |
| 2016 | $ 58,000 | $ 29,000 | $ 87,000 |
| 2017 | $ 59,000 | $ 39,000 | $ 88,000 |
| 2018 | $ 60,000 | $ 30,000 | $ 90,000 |
| 2019 | $ 61,000 | $ 31,000 | $ 92,000 |
| 2020 | $ 62,000 | $ 32,000 | $ 94,100 |
| 2021 | $ 63,000 | $ 33,000 | $ 96,000 |
| 2022 | $ 64,000 | $ 34,000 | $98,000 |
| 2023 | $ 66,000 | $ 35,000 | $101,000 |
| 2024 | $ 67,000 | $ 36,000 | $103,000 |
| 2025 | $ 68,000 | $ 37,000 | $105,000 |

***Table 14.12 – Sipaulovi/Mishongnovi Projected 10 Year Budget***

| Year | Base Fee | Usage Fee | Total Annual Cost |
|---|---|---|---|
| 2015 | $ 49,000 | $ 24,000 | $ 73,000 |
| 2016 | $ 50,000 | $ 25,000 | $ 75,000 |
| 2017 | $ 51,000 | $ 25,000 | $ 76,000 |
| 2018 | $ 52,000 | $ 26,000 | $ 78,000 |
| 2019 | $ 53,000 | $ 27,000 | $ 80,000 |
| 2020 | $ 54,000 | $ 28,000 | $ 82,000 |
| 2021 | $ 55,000 | $ 29,000 | $ 84,000 |
| 2022 | $ 56,000 | $ 29,000 | $ 85,000 |
| 2023 | $ 57,000 | $ 30,000 | $ 87,000 |
| 2024 | $ 58,000 | $ 31,000 | $ 89,000 |
| 2025 | $ 59,000 | $ 32,000 | $ 91,000 |

## 10-Year Financial Plan

A 10-year financial projection is based on assumptions at the time, and documented within this report. The financial analysis and projections are based on a complete and fully operational water system. The costs do not reflect phasing of construction which could occur over several years and require specific financial strategies to fund construction and operation of a portion of the HAMP system. Until the construction schedule is determined, based in part on the funding availability, it is not possible to determine the appropriate financial strategies. These strategies could include short term loans or staged implementation of user fees.

Future HAMP system costs and revenues will be subject to numerous variables that have not yet been determined. These include:

- Construction schedule and construction phasing.
- Amount and schedule of grants and loans for construction.
- Hopi Tribe funding.
- Construction and operating cost inflation through construction.
- Loan requirements.
- HPUC policies and strategies for regulation of the HPUA and utility rates.
- Adopted user fees.
- Approved capacity allocations for each Village.
- Actual water usage.
- Possible expansion of the HPUA into operation of Village water systems or other utilities such as power and gas.

- Other unknown conditions.

As these conditions and variables are defined or resolved, the cost and revenue projections should continue to be revised and refined. There are several factors that may affect the financial projections more than others.

***Actual capital costs and funding***

Capital costs provided in the PER are estimates and can vary as much as 25 percent higher or lower than the estimates. The actual capital costs to be re-paid by the Villages are subject to the funding contributions from federal agencies, the Hopi Tribe, and other potential funding sources. These changes would impact the initial base fee assumed in this study.

***Actual operating costs***

The estimated operating costs developed in this study are intended to be conservative and reflect the typical costs of a well-managed and well-operated water utility. There are many future unknowns related to operating costs including electricity rates and staffing needs. The actual costs may vary by as much as 10 to 20 percent higher or lower than the estimates, and will also be subject to control by the HPUC through approval of the HPUA annual budgets.

***Water usage by each Village.***

If water usage or Village growth is less than expected, the revenues may not be adequate to fund the costs. This situation would require an increase in either, or both, the base fee and usage fee assumed initially, or alternatively, a reduction of the cost budget.

If the percentage of total usage by each Village is different than assumed, their base fees will need to be adjusted to balance the Village costs according to their actual usage.

User fees should be reviewed and adjusted annually based on actual usage and actual costs as part of the budget process and approval by the HPUC. The amount of change in fees or costs to each Village should be limited to an amount, for example, 20 percent, to avoid unanticipated sudden large increases to an individual Village.

***Phased Construction***

Costs, funding, and financing the HAMP system will be impacted if the construction is conducted in phases or over an extended period of time. A cash flow plan is required to provide continuing funding during construction before significant revenues are received from the users.

If only a portion of the system is initially constructed due to funding limitations, a plan for financing the capital costs must be developed to address the revenue needs. For example, if the system is built to extend HAMP service to FMCV only as a first phase, it would not be practical for the FMCV to fund the entire construction cost that will ultimately benefit all four Villages.

There are too many options or scenarios for phasing and the financial impacts to provide a clear financial plan. Once the actual construction timeframe and the need for phasing are identified, a financial plan should be developed to provide adequate funding.

***Expansion of HPUA Services***

If requested by one or more Villages, and agreed to by HPUA, the services of HPUA could expand beyond the initial HAMP wholesale water system into operation and maintenance of Village water systems and other utility services including Village wastewater management. If HPUA does provide these expanded services, it would potentially impact HPUA staffing and administration requirements, and may change the organization operating costs and revenues, as well as the distribution of costs to the initial HAMP Villages and the new participating Villages and systems.

## Accounting and Billing System

The new HPUA utility organization will need to set up a system of accounts for expenditures and revenues, as well as separate reserve or holding funds. Guidance on accounting systems for water utilities is available from a number of sources including the Governmental Accounting Standards Board (GASB) and AWWA.

Typical water utility accounts include the following:

*Revenue accounts*

Revenues are tracked separately and would include accounts for user fee revenue for each Village or other future customer. Note that if the HPUA accepts management of Village systems in the future, revenue accounts will need to be set up for each individual user that is billed. Other revenue accounts could include specific connection fees, water sales to non-regular customers, or contributions by the Hopi Tribe.

*Debt repayment and debt reserve accounts*

Grant and loan accounts and billing will be identified as part of the USDA-RD loan requirements and typically require dedicated account and detailed tracking during and after construction.

If there is other debt, such as loans by the Tribe for the HAMP, they will need to have separate accounts.

*Capital expenditures*

Capital budget and capital expenditures accounts are typically used for higher value (>$5,000), longer life assets and are typically tracked in a separate set of accounts for specific expenditures. This general capital outlay account is for minor projects and new equipment expenditures less than $200,000.

*Construction project accounts*

Separate accounts for construction project phases or contracts will be required to track the expenditures and payments during construction. The HPUC and the Tribal Council may have specific requirements for managing and control of capital projects greater than $200,000.

*Asset management*

It is recommended that an asset management account be established to track the expenditures and activities related to each major asset. These accounts are used to maintain the asset history, determine life cycle costs, and to adjust rehabilitation and replacement schedules and costs as necessary. There are multiple software systems that have the capability to track activities as well as provide maintenance schedules and tracking.

A suggested chart of accounts for the HPUA is included in Appendix G. This set of accounts includes only the expected revenues and costs for the HAMP system with three Villages as customers. If the HPUA expands its operation into Village systems or other utility operations, a different set of accounts will be required.

This suggested outline of accounts is intended to provide line items for managing the financial condition, budget, and operations of the HAMP system and HPUA. The actual chart of accounts should be developed and modified by the HPUA Director in accordance with specific requirements for the following:

- Federal grant and loan funds.
- Direction and requirements from the HPUC.
- Operating budget development and management.
- Accounting software or system selected.
- Other financial requirements to be defined.

## Financial Management Controls and Oversight

### *Annual budgets*

An annual budget should be prepared and submitted to the Board for approval. The budget will identify expenditures planned for the coming year, as well as projected revenues. The budget should be broken down into representative charges to each Village or user, and depending on the organization, to estimated monthly charges for each user or connection. Any significant year-to-year budget changes should be identified and justified as part of the budget submittal.

In accordance with the utility financial accounts system, the budget should address both O&M and capital needs and should be broken down in accordance with the system of accounts and capital projects. Fund balances are part of the projected budget.

In addition, USDA-RD loan provisions will require an annual budget and comparison of expenditures and revenues with those projected in the grant and loan.

### *Utility Board Oversight and Approval*

One of the primary responsibilities of the HPUC is review and approval of the HPUA budget. This approval then authorizes the utility manager to expend the budget except for specific approvals reserved for the Board such as capital expenditures or construction project.

The utility manager should provide monthly status reports on the budget, including expenditures and revenues, to the Board

### *Financial statements*

Regular reports (monthly or quarterly) of expenditures, revenues, and fund balances in comparison to budgets should be provided to the HPUC by the HPUA Director.

Grant/loan agency financial reports will be submitted as required by the individual funding agencies. Typically these will be spelled out in the grant/loan requirements, and are expected to be at least an annual audit and review of the construction budget and fund, and may include quarterly reports on construction project status.

The HPUA should authorize an annual independent accounting, risk, and financial procedural audit along with preparation of financial statements in accordance with standard government accounting procedures. Such an audit should be conducted by an independent Certified Public Accounting firm. The Tribe and HPUC may also elect to conduct audits of the HPUA accounts.

# 15. Implementation Plan

Planning for implementation of the Hopi Water System Strategic Plan depends on a number of decisions yet to be made. Among the most significant are the decisions to proceed to apply for USDA-RD funding and, subsequently, the approved level of funding by USDA. These decisions impact the schedule for implementing the HAMP, and the financial commitment and costs to the Hopi Tribe and the Villages. These decisions will also likely impact the costs and user fees identified in this plan.

Once the project schedule is determined, a detailed implementation plan can be developed including the operation, management, and administrative elements identified in this strategic plan. Generally, the strategic plan elements should be developed and implemented before the HAMP water system construction is completed. The HAMP system construction is currently estimated to be complete, at least in part, in 2018.

Once the decision and commitments are made to proceed with the project and apply for the USDA funding, it is recommended the Tribal Council proceed to hire an HPUA Director and to fund the establishment of the HPUA and HPUC. The HPUC should also be created to provide early guidance and direction to the Director and the Tribal Council.

Some of the early requirements for implementation include:

- Develop an accounting system, with an emphasis on tracking the design and construction projects costs, and meeting the USDA-RD cost accounting requirements.
- Develop administrative processes and procedures for monitoring, approving, and reporting HAMP construction work, in accordance with USDA-RD requirements. This may require obtaining or identifying administrative staff support, and interim office and administrative facilities.
- Identify the capabilities and commitment of Tribal departments to assist with the Strategic Plan implementation, specifically Legal, Financial, Human Resources, and Water Resources among others.
- Discuss and decide VUMC involvement in the HPUA and HAMP water system.

# Appendices

A. Acronyms
B. References
C. Asset Data Template
D. Asset Register and Rehabilitation and Replacement Costs
E. Job Descriptions
F. Estimated Operation & Maintenance Costs
G. Chart of Financial Accounts
H. Not Used
I. HPUA and HPUC Establishment Act – Ordinance 60

# Appendix A

## Acronym Definitions

**APS** – Arizona Public Service

**Avg** - average

**ATV** – All Terrain Vehicle

**AWWA** – American Water Works Association

**BF** – Backflow (backflow preventer)

**BIA** – Bureau of Indian Affairs

**CCTV** – Closed Circuit Television

**CPA** - Certified Public Accountant

**CPR** – Cardio–Pulmonary Resuscitation

**DI** – Ductile Iron

**ea** - each

**EPA** – US Environmental Protection Agency

**ERP** – Emergency Response Plan

**FCC** – Federal Communications Commission

**FEMA** – Federal Emergency Management Administration

**FMCV** – First Mesa Consolidated Villages

**ft** – feet

**gal** – gallons

**GASB** – Government Accounting Standards Board

**gpd** – gallons per day

**gpm** – gallons per minute

**GPS** – Geographical Positioning System

**HAMP** – Hopi Arsenic Mitigation Project

**HDPE** – High Density Polyethylene (pipe)

**HPUA** – Hopi Public Utility Authority

**HPUC** – Hopi Public Utility Commission

**hp** – horsepower

**hr** – hour

**IHS** – Indian Health Service

**HUD** – Housing and Urban Development

**HVAC** – Heating, Ventilating, Air Conditioning

**KW** – Kilowatts

**KWH** – Kilowatt Hours

**MCC** – Motor Control Center

**MCL** – Maximum Contaminant Level

**mo** – month

**NTUA** – Navajo Tribal Utility Association

**O&M** – Operation and Maintenance

**ORP** – Oxidation–Reduction Potential

**PER** – Preliminary Engineering Report

**pH** – measure of acidity/alkalinity in water

**psi** – pounds per square inch

**PLC** – Programmable Logic Controller

**PM** – Preventive Maintenance

**PMR** – Private Mobile Radio)

**PPE** – Personal Protective Equipment

**PRV** – Pressure Regulating Valve

**R&R** – Rehabilitation and Replacement

**Rehab** – rehabilitation

**SES** – Service Entrance Section (electrical)

**sf** – square feet

**TDH** – Total Dynamic Head

**US** – United States

**USDA** – United States Department of Agriculture

**USDA–RD** – United States Department of Agriculture – Rural Development

# Appendix B

## References


AWWA Standard G400-9. "Utility Management System". August, 2009.

AWWA. Financial Management for Water Utilities. 2012.

AWWA Manual of Practice M1. Water Rates. 1991.

AWWA Manual of Practice M5. Water Utility Management. 2005.

AWWA Manual of Practice M19. Emergency Planning for Water Utilities. 2001.

GHD. "Hopi Water System Strategic Plan, 50 Percent Report". July 2011.

GHD. "Total Management Plans". 2007.

IHS. "Hopi Arsenic Mitigation Project, Draft Preliminary Engineering Report". April, 2012.

USDA Rural Development. "Water and Wastewater Loan and Grants, RUS Instruction 1780". Utilities Program Regulations. 7 CFR 1780. 1999.

"Charter and Articles of Incorporation of Village Utility Management Cooperative". ca. 2000.

# Appendix C

***Table C.1 – Typical Asset Data Template***

| Asset Data | | Descriptions/Comments for Hopi Water System |
|---|---|---|
| Asset Name | | Common name, e.g. Turquoise Well Pump 1. |
| Asset Class | | Pump<br>Motor<br>Valve<br>Pipe<br>Instrument<br>Controller<br>Tank<br>Building<br>Electrical<br>HVAC<br>Other |
| Asset Number | | Typically an organized system for numbering assets and associated appurtenances. Most relevant when there are many assets such as pipe segments, valves, etc. For other assets, such as wells or booster pumps, asset name should be sufficient. |
| Location | | Physical location such as Well Building 1 or Pipeline Station 1200 + 37. |
| Performance Objective | | Purpose of the asset and target performance criteria or design point, e.g. pump 300 gpm at 200 ft TDH. |
| Criticality | | Relative Impact of loss of the asset on service or cost.<br>1 – No loss of service or significant cost.<br>2 – Loss of service for less than 25% of users for more than 4 hours or some emergency response and repair cost < $5,000.<br>3 – Loss of service for more than 25% of users for more than 4 hours or significant emergency response and repair cost > $5,000.<br>4 – Total loss of service for less than 24 hours.<br>5 – Total loss of service for more than 24 hours. |
| | | |
| Type | | e.g. horizontal centrifugal pump or transmission pipeline. |
| Size | | Size or dimensions, e.g. 6 inch pump, 10 hp motor. |
| Capacity | | Maximum design capacity of the asset, e.g. well capacity 350 gpm, pipe capacity 3,000 gpm. |
| Material | | Materials of construction, e.g. concrete block structure, ductile iron pipe. |
| Manufacturer | | |
| Model | | |
| | | |
| Expected Life | | Estimated life of asset before replacement assuming regular maintenance. |
| Date Installed | | |
| Installed Cost | | Includes equipment or material and labor to install. |
| Maintenance Schedule | | |
| 1. Task/Frequency<br>2. Task/Frequency<br>3. Task/Frequency | | List of scheduled preventive maintenance tasks and frequency; e.g. change annually, inspect bearings every 5 years. |
| | | |

| Asset Data | | Descriptions/Comments for Hopi Water System |
|---|---|---|
| Rehabilitation Schedule | | |
| 1. Task/Frequency<br>2. Task/Frequency | | List of scheduled major rehabilitation or overhaul and frequency, e.g. rewind motor every 10 years. |
| | | |
| Estimated Annual Cost | | Initial estimate of annual costs including power, materials, maintenance, etc. |

# Appendix D

## *Table D.1 Rehabilitation and Replacement Costs*

| HAMP Annual R&R | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| Inflation, annual 20 yr | 2.0% | | | | | | | | | | |
| Fund Interest, annual 20 yr | 1.6% | | | | | | | | | | |
| | | | | | | | | | | | |
| | Size/ Capacity | Quantity | Replace Life (years) | Rehab Interval (years) | Replace Cost each | Rehab Cost each | Future Replace Cost each | 20 Year Future Rehab Cost each | Annual Replace Cost Total | Annual Rehab Cost Total | Total Annual R&R Cost |
| Wells | | | | | | | | | | | |
| Well Pump/Motor | 415 gpm/710 TDH/ | 2 | 30 | 10 | $ 35,000 | $ 10,000 | $ 63,398 | $ 12,190 | $ 3,326 | $ 3,540 | $ 6,866 |
| | 100 HP | | | 20 | | | | $ 14,859 | | | |
| Well Booster Pump | 415 gpm/415 TDH/ | 2 | 20 | 10 | $ 10,000 | $ 3,000 | $ 14,859 | $ 3,657 | $ 1,273 | $ 1,062 | $ 2,335 |
| | 60 HP | | | 20 | | | | $ 4,458 | | | |
| Casing&Screens | 2000 ft | 2 | 40 | 15 | $ 500,000 | $ 10,000 | $ 1,104,020 | $ 13,459 | $ 39,834 | $ 1,602 | $ 41,436 |
| | | | | | | | | | | | |
| Pump Column | 700 ft | 2 | 30 | 10 | $ 10,000 | $ 5,000 | $ 18,114 | $ 6,095 | $ 950 | $ 1,770 | $ 2,720 |
| | | | | 20 | | | | $ 7,430 | | | |
| Valves | 8" gate | 4 | 30 | 10 | $ 1,500 | $ 500 | $ 2,717 | $ 609 | $ 285 | $ 354 | $ 639 |
| | | | | 20 | | | | $ 743 | | | |
| Well Building | | | | | | | | | | | |
| | | | | | | | | | | | |
| Structure | 20' x 30' Steel | 1 | 40 | 15 | $ 35,000 | $ 3,000 | $ 77,281 | $ 4,038 | $ 1,394 | $ 240 | $ 1,634 |
| | | | | | | | | | | | |
| VFD/PLC/Telemetry | | 1 | 15 | 0 | $ 20,000 | $ - | $ 26,917 | $ - | $ 1,602 | $ - | $ 1,602 |
| | | | | | | | | | | | |
| Electrical Equip | | 1 | 30 | 10 | $ 35,000 | $ 5,000 | $ 63,398 | $ 6,095 | $ 1,663 | $ 885 | $ 2,548 |
| | | | | 20 | | | | $ 7,430 | | | |
| Diesel Standby Generator | 375 KW | 2 | 25 | 5 | $ 125,000 | $ 3,000 | $ 205,076 | $ 3,312 | $ 13,472 | $ 2,826 | $ 16,298 |
| | | | | 10 | | | | $ 3,657 | | | |
| | | | | 15 | | | | $ 4,038 | | | |
| | | | | 20 | | | | $ 4,458 | | | |
| HVAC | | 1 | 20 | 5 | $ 5,000 | $ 1,000 | $ 7,430 | $ 1,104 | $ 318 | $ 471 | $ 789 |
| | | | | 10 | | | | $ 1,219 | | | |
| | | | | 15 | | | | $ 1,346 | | | |
| | | | | 20 | | | | $ 1,486 | | | |
| Surge Tank | 5000 gal | 1 | 40 | 10 | $ 10,000 | $ 1,000 | $ 22,080 | $ 1,219 | $ 398 | $ 177 | $ 575 |
| | | | | 20 | | | | $ 1,486 | | | |
| Surge Air System | | 1 | 20 | 10 | $ 8,000 | $ 1,000 | $ 11,898 | $ 1,219 | $ 509 | $ 177 | $ 686 |
| | | | | 20 | | | | $ 1,486 | | | |
| Chlorination System | | 1 | 20 | 5 | $ 5,000 | $ 500 | $ 7,430 | $ 552 | $ 318 | $ 235 | $ 554 |
| | | | | 10 | | | | $ 609 | | | |
| | | | | 15 | | | | $ 673 | | | |

| | Size/ Capacity | Quantity | Replace Life (years) | Rehab Interval (years) | Replace Cost each | Rehab Cost each | Future Replace Cost each | 20 Year Future Rehab Cost each | Annual Replace Cost Total | Annual Rehab Cost Total | Total Annual R&R Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 20 | | | | $ 743 | | | |
| **Storage Tank** | | | | | | | | | | | |
| Tank | 260,000 gal | 1 | 40 | 20 | $ 1,500,000 | $ 25,000 | $ 3,312,059 | $ 37,149 | $ 59,751 | $ 1,591 | $ 61,342 |
| Piping | 500' 8" | 1 | 40 | 10 | $ 35,000 | $ 1,000 | $ 77,281 | $ 1,219 | $ 1,394 | $ 177 | $ 1,571 |
| | | | | 20 | | | | $ 1,486 | | | |
| Altitude Valve | | 1 | 25 | 10 | $ 10,000 | $ 1,000 | $ 16,406 | $ 1,219 | $ 539 | $ 177 | $ 716 |
| | | | | 20 | | | | $ 1,486 | | | |
| Telemetry/Controls | | 1 | 15 | 0 | $ 10,000 | $ - | $ 13,459 | $ - | $ 801 | $ - | $ 801 |
| **Transmission Pipelines** | | | | | | | | | | | |
| 12" PVC Pipe | | 75000 | 75 | 0 | $ 48 | $ - | | | | | |
| 8" Pipe | | 68,000 | 75 | 0 | $ 35 | $ - | | | | | |
| 4" & 6" Pipe | | 34000 | 75 | 0 | $ 30 | $ - | | | | | |
| 12" Isolation Valves | | 22 | 30 | 15 | $ 4,000 | $ 500 | $ 7,245 | $ 673 | $ 4,181 | $ 881 | $ 5,062 |
| 8" Isolation Valves | | 18 | 30 | 15 | $ 2,000 | $ 500 | $ 3,623 | $ 673 | $ 1,711 | $ 721 | $ 2,431 |
| 4" & 6" Isolation Valves | | 21 | 30 | 15 | $ 1,500 | $ 500 | $ 2,717 | $ 673 | $ 1,497 | $ 841 | $ 2,338 |
| Air Release/Blowoff Valves | | 15 | 20 | 5 | $ 2,000 | $ 500 | $ 2,972 | $ 552 | $ 1,909 | $ 3,532 | $ 5,441 |
| | | | | 10 | | | | $ 609 | | | |
| | | | | 15 | | | | $ 673 | | | |
| | | | | 20 | | | | $ 743 | | | |
| PRV | | 2 | 25 | 5 | $ 5,000 | $ 500 | $ 8,203 | $ 552 | $ 539 | $ 471 | $ 1,010 |
| | | | | 10 | | | | $ 609 | | | |
| | | | | 15 | | | | $ 673 | | | |
| | | | | 20 | | | | $ 743 | | | |
| Altitude Valve | | 1 | 25 | 5 | $ 10,000 | $ 500 | $ 16,406 | $ 552 | $ 539 | $ 235 | $ 774 |
| | | | | 10 | | | | $ 609 | | | |
| | | | | 15 | | | | $ 673 | | | |
| | | | | 20 | | | | $ 743 | | | |
| Paved Roadway | 4,350' | 1 | 20 | 10 | $ 65,250 | $ 20,000 | $ 96,958 | $ 24,380 | $ 4,152 | $ 2,268 | $ 6,419 |
| **Village Connections** | | | | | | | | | | | |

***Table D.1 (cont'd.)***

| | Size/ Capacity | Quantity | Replace Life (years) | Rehab interval (years) | Replace Cost each | Rehab Cost each | Future Replace Cost each | 20 Year Future Rehab Cost each | Annual Replace Cost Total | Annual Rehab Cost Total | Total Annual R&R Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Flowmeter & Vault | | 3 | 25 | 10 | $ 5,000 | $ 1,000 | $ 8,203 | $ 1,219 | $ 808 | $ 531 | $ 1,339 |
| | | | | 20 | | | | $ 1,486 | | | |
| Backflow Preventer | | 3 | 25 | 10 | $ 3,000 | $ 500 | $ 4,922 | $ 609 | $ 485 | $ 266 | $ 751 |
| | | | | 20 | | | | $ 743 | | | |
| Chlorination Facility | | 3 | 15 | 5 | $ 30,000 | $ 1,000 | $ 40,376 | $ 1,104 | $ 7,209 | $ 1,413 | $ 8,622 |
| | | | | 10 | | | | $ 1,219 | | | |
| | | | | 15 | | | | $ 1,346 | | | |
| | | | | 20 | | | | $ 1,486 | | | |
| Altitude Valves | | 3 | 25 | 10 | $ 10,000 | $ 1,000 | $ 16,406 | $ 1,219 | $ 1,617 | $ 531 | $ 2,148 |
| | | | | 20 | | | | $ 1,486 | | | |
| **Booster Station** | | | | | | | | | | | |
| Structure | 20 x 30 Steel | 1 | 40 | 15 | $ 40,000 | $ 3,000 | $ 88,322 | $ 4,038 | $ 1,593 | $ 240 | $ 1,834 |
| Pumps (4) | 100/130/130/200 gpm | 4 | 25 | 10 | $ 15,000 | $ 2,000 | $ 24,609 | $ 2,438 | $ 3,233 | $ 1,416 | $ 4,649 |
| | 10/15/15/20 HP; 125' | | | 20 | | | | $ 2,972 | | | |
| 8" Valves | | 8 | 30 | 15 | $ 1,500 | $ 500 | $ 2,717 | $ 673 | $ 570 | $ 40 | $ 4,882 |
| VFD/PLC/Telemetry | | 1 | 15 | 0 | $ 20,000 | $ - | $ 26,917 | $ - | $ 1,602 | $ - | $ 1,602 |
| Electrical Equip | | 1 | 30 | 10 | $ 25,000 | $ 3,000 | $ 45,284 | $ 3,657 | $ 1,188 | $ 531 | $ 1,719 |
| | | | | 20 | | | | $ 4,458 | | | |
| Diesel Standby Generator | 40 KW | 1 | 25 | 5 | $ 50,000 | $ 3,000 | $ 82,030 | $ 3,312 | $ 2,694 | $ 1,413 | $ 4,107 |
| | | | | 10 | | | | $ 3,657 | | | |
| | | | | 15 | | | | $ 4,038 | | | |
| | | | | 20 | | | | $ 4,458 | | | |
| Surge Tank | 2,500 gallon | 1 | 40 | 10 | $ 8,000 | $ 1,000 | $ 17,664 | $ 1,219 | $ 319 | $ 177 | $ 496 |
| | | | | 20 | | | | $ 1,486 | | | |
| Surge Air System | | 1 | 20 | 10 | $ 5,000 | $ 1,000 | $ 7,430 | $ 1,219 | $ 318 | $ 177 | $ 495 |
| | | | | 20 | | | | $ 1,486 | | | |
| **Sipaulovi/Mishongnovi Tank** | | | | | | | | | | | |
| Tank | 110,000 gal | 1 | 40 | 20 | $ 300,000 | $ 15,000 | $ 662,412 | $ 22,289 | $ 11,950 | $ 954 | $ 12,905 |
| Piping and valves | 500' | 1 | 40 | 10 | $ 35,000 | $ 1,000 | $ 77,281 | $ 1,219 | $ 1,394 | $ 177 | $ 1,571 |
| | | | | 20 | | | | $ 1,486 | | | |
| Altitude Valve | | 1 | 25 | 5 | $ 10,000 | $ 500 | $ 16,406 | $ 552 | $ 539 | $ 235 | $ 774 |
| | | | | 10 | | | | $ 609 | | | |
| | | | | 15 | | | | $ 673 | | | |

***Table D.1 (cont'd.)***

| | Size/ Capacity | Quantity | Replace Life (years) | Rehab interval (years) | Replace Cost each | Rehab Cost each | Future Replace Cost each | 20 Year Future Rehab Cost each | Annual Replace Cost Total | Annual Rehab Cost Total | Total Annual R&R Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 20 | | | | $ 743 | | | |
| Controls | | 1 | 15 | 0 | $ 2,500 | $ - | $ 3,365 | $ - | $ 200 | $ - | $ 200 |
| PRV | | 2 | 25 | 5 | $ 5,000 | $ 1,000 | $ 8,203 | $ 1,104 | $ 539 | $ 942 | $ 1,481 |
| | | | | 10 | | | | $ 1,219 | | | |
| | | | | 15 | | | | $ 1,346 | | | |
| | | | | 20 | | | | $ 1,486 | | | |
| **Storage/Admin Building** | | | | | | | | | | | |
| Structure | | 1 | 40 | 15 | $ 75,000 | $ 3,000 | $ 165,603 | $ 4,038 | $ 2,988 | $ 240 | $ 3,228 |
| Hoist | 1 ton | 1 | 30 | 10 | $ 10,000 | $ 500 | $ 18,114 | $ 609 | $ 475 | $ 89 | $ 564 |
| | | | | 20 | | | | $ 743 | | | |
| HVAC | | 1 | 20 | 5 | $ 10,000 | $ 1,000 | $ 14,859 | $ 1,104 | $ 636 | $ 471 | $ 1,107 |
| | | | | 10 | | | | $ 1,219 | | | |
| | | | | 15 | | | | $ 1,346 | | | |
| | | | | 20 | | | | $ 1,486 | | | |
| **Vehicles** | | | | | | | | | | | |
| Service Truck | 1 Ton | 1 | 6 | 3 | $ 30,000 | $ 1,000 | $ 33,785 | $ 1,061 | $ 10,384 | $ 899 | $ 11,283 |
| | | | 12 | 6 | | | $ 38,047 | $ 1,126 | | | |
| | | | 18 | 9 | | | $ 42,847 | $ 1,195 | | | |
| | | | | 12 | | | | $ 1,268 | | | |
| | | | | 15 | | | | $ 1,346 | | | |
| | | | | 18 | | | | $ 1,428 | | | |
| ATV | | 1 | 6 | 3 | $ 15,000 | $ 500 | $ 16,892 | $ 531 | $ 5,192 | $ 449 | $ 5,641 |
| | | | 12 | 6 | | | $ 19,024 | $ 563 | | | |
| | | | 18 | 9 | | | $ 21,424 | $ 598 | | | |
| | | | | 12 | | | | $ 634 | | | |
| | | | | 15 | | | | $ 673 | | | |
| | | | | 18 | | | | $ 714 | | | |
| Totals | | | | | | | | | $ 198,290 | $ 35,426 | $ 237,987 |
| 20 Yr, R+R Total (excluding Year 20) | | | | | | | $ 212,871 | | $ 25,135 | 25,555 | |

***Table D.1 (Cont'd.)***

# Appendix E

## Job Description – Hopi Public Utilities Authority (HPUA) Director

Reports to: Hopi Public Utilities Commission (HPUC)
Salary Range: $50,000 to $60,000 per year

***Job Description:***

This individual is responsible for managing and directing all aspects of utility operations, maintenance, administration, and management of multiple water facilities or utility systems. Provides direction and oversight to HPUA staff and contractors, including managing and coordinating the construction of the Hopi Arsenic Mitigation Project (HAMP) water system to serve multiple Villages. Will have the knowledge and experience to provide technical direction, and may be the designated operator in responsible charge of water and wastewater facilities and systems. Work is performed under the general direction of the HPUC, but will make independent decisions and assure compliance with regulatory requirements.

***Key Duties and Responsibilities:***

- Monitor facility and system performance, and direct and perform adjustments to systems to maintain reliable and proper operation and performance.
- Review operating information and reports and implement corrections and improvements to operating and maintenance procedures and practices.
- Schedule, monitor, coordinate and direct the work of assigned staff and contractors.
- Support operators in monitoring and troubleshooting water treatment processes and equipment systems and direct changes in operation.
- Read and interpret technical manuals, operating and laboratory data, and engineering plans.
- Develop and maintain standard operating and maintenance procedures.
- Schedule, coordinate, and oversee water sampling and operating tests.
- Develop, coordinate, and perform preventive maintenance tasks, repair, and replacement of equipment, pipes, and other facility and system components.
- Develop and maintain accounting, budgeting, billing, and financial management systems.
- Develop utility rate recommendations.
- Develop, monitor and control operating and maintenance budgets and costs.
- Respond to emergency situations and direct and perform after-hours on-call assignments and emergency response as required.
- Prepare regulatory reports such as Self Monitoring Report Forms, and communicate and coordinate with regulatory agencies as necessary.
- Prepare operations and management reports and coordinate, communicate, and support the HPUC.
- Hire and manage staff and provide staff development and performance review.

- Coordinate and communicate with Villages or other users on a regular basis and meet users and Board performance and service level expectations.
- Coordinate, schedule, and monitor contractor operations and performance.

***Qualifications and Capabilities:***

- Minimum high school diploma or GED equivalency.
- Valid Driver's License.
- Possession of minimum Grade 3 Operator Certification in water treatment and water distribution. Minimum 5 years directly related experience and thorough knowledge of standard procedures and practices for operation, maintenance, and management of water facilities and systems, and utility administration.
- Thorough knowledge and proficiency of methods, equipment, processes, and controls for operation of water and wastewater facilities and systems.
- Ability to develop and prepare written procedures and methods for others.
- Knowledge and experience in preparing and justifying utility budgets and utility rates.
- Skills in use of computers including developing standard forms, reports, and data analysis.
- Ability to effectively communicate verbal and written information directions and procedures, and to interact with co-workers, supervisors, contractors, and clients in a professional manner.
- Ability to perform duties independently and at remote locations, including independent decisions and problem solving in routine and emergency situations.
- Ability to operate safely and effectively in an industrial facility environment including:
    - Demonstrated knowledge of safety hazards and requirements, and safe practices in water and wastewater facilities and system.
    - Capability to understand verbal instructions, to discern audible warning or emergency alarms including vehicle backup warnings, and to discern color-coded alarms and equipment indicators.
    - Manual dexterity to adjust equipment and operate hand tools.
    - Sufficient physical flexibility, stamina, and balance to safely perform typical operation and maintenance tasks including bending, kneeling, reaching, climbing, working on ladders, walking over rough terrain, and lifting or moving up to 40 pounds.

# Job Description – Senior Operator

Reports to: HPUA Director
Salary Range: $25,000 to $33,000

***Job Description***

The individual in this position performs skilled work to operate and maintain water systems under the jurisdiction of the Hopi Public Utility Authority. This is a lead technical position and work is performed independently with general supervision, and/or following documented and standard procedures. This position may be responsible for coordinating and supervising the work of other operators and contractors.

***Key Responsibilities and Duties:***

- Monitor systems and make routine equipment and control adjustments to maintain proper operation and performance.
- Monitor control panels, gauges, and meters, to detect and correct variations in operating conditions.
- Operate manual and automated valves, pumps, gates, and control systems to maintain proper operation.
- Read and interpret technical manuals, operating and maintenance procedures, and monitoring results.
- Perform water sampling and basic operating tests.
- Perform basic and routine maintenance tasks such as lubrication, oil changes, etc and perform or assist with repair maintenance tasks.
- Perform basic mathematical calculations for system operation.
- Perform general custodial and housekeeping tasks.
- Operate motor vehicles, power equipment, and hand tools.
- Respond to emergency situations and perform after hours on-call assignment as required.
- Maintain facility logs, record and compile operating and maintenance data, prepare written reports.

***Qualifications and Capabilities:***

- Valid Driver's License.
- Possession of minimum Grade 2 Operator Certification in water distribution.
- Minimum 3 years directly related experience and knowledge of standard procedures for operation and maintenance of water and wastewater facilities and systems.
- Ability to follow written and oral instruction and procedures.

- Ability to communicate information and interact with co-workers, supervisors, and clients in a professional manner.
- Ability to perform duties independently and at remote locations.
- Ability to operate safely and effectively in an industrial facility environment including:
  - Demonstrated knowledge of safety hazards and safe practices in water and wastewater facilities and system.
  - Capability to understand verbal instructions, to discern audible warning or emergency alarms including vehicle backup warnings, and to discern color-coded alarms and equipment indicators.
  - Manual dexterity to adjust equipment and operate hand tools.
  - Sufficient physical flexibility, stamina, and balance to safely perform typical operation and maintenance tasks including bending, kneeling, reaching, climbing, working on ladders, walking over rough terrain, and lifting or moving up to 40 pounds.

# Appendix F

## *Table F.1 Estimated O&M Costs*

| | | | Grid Power | | | Primary Generator | | | |
|---|---|---|---|---|---|---|---|---|---|
| Avg Daily Flow (2015), gpd | 197,600 | | Alt 2 | | | Alt 3 | | | |
| Avg Daily Flow (2035),gpd | 282,343 | | | | | | | | |
| | | | | Annual | | | Annual | | |
| | | | | Cost | | | Cost | | |
| O&M Staff | | | $ 79,008 | | | | | | |
| Operator | 2 | $ 54,080 | | | | | | | |
| Hourly Rate - Avg | $ 13.00 | | | | | | | | |
| Benefits | 25% | $ 13,520 | | | | | | | |
| Overtime (10%) | 10% | $ 5,408 | | | | | | | |
| | | | | | | | | | |
| Management Admin Staff | | | $ 96,200 | | | | | | |
| Manager (FTE) | 1 | | | | | | | | |
| Hourly Rate | $ 25.00 | $ 52,000 | | | | | | | |
| Admin Staff (FTE) | 1 | | | | | | | | |
| Hourly Rate | $ 12.00 | $ 24,960 | | | | | | | |
| Benefits | 25% | $ 19,240 | | | | | | | |
| | | | | | | | | | |
| **Annual Staff Costs** | | | | **$169,208** | | | $169,208 | | |
| | | | | | | | | | |
| **Grid Power Costs** | | | | | | | | | |
| Power, Wells | | | $93,736 | | | | | | |
| Head,ft | 1325 | | | | | | | | |
| Daily Flow, gpd | 197,600 | | | | | | | | |
| Tot Eff. (%) | 75% | | | | | | | | |
| KWH/day | | | 2335 | | | | | | |
| Cost/KWH ($) | $ 0.10 | | | | | | | | |
| Other (% of subtotal) | 10% | | | | | | | | |
| | | | | | | | | | |
| Power, 2nd Mesa BS | | | $5,292 | | | | | | |
| Head,ft | 225 | | | | | | | | |
| Daily Flow, gpd | 55,784 | | | | | | | | |
| Tot Eff. (%) | 0.75 | | | | | | | | |
| KWH/day | | | 132 | | | | | | |
| Cost/KWH | $ 0.10 | | | | | | | | |
| Other (%) | 10% | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Admin/Service Bldg | | | | | | | | | |
| Avg KWH/day | 75 | | $4,106 | | | | $4,106 | | |
| Cost/KWH | $ 0.15 | | | | | | | | |
| | | | | | | | | | |
| Village Chlorination Facilities | 3 | | $ 1,643 | | | | $ 1,643 | | |
| Avg KWH/day | 10 | | | | | | | | |
| Cost/KWH | $ 0.15 | | | | | | | | |
| | | | | | | | | | |
| **Annual Power Costs** | | | | **$104,777** | | | $5,749 | | |
| | | | | | | | | | |
| **Diesel Fuel** | | | | | | | | | |
| Wells (375 KW) gal/hr | | | | | 18 | $ 453,823 | | | |
| Well hr/day @ 400 gpm | | | | | 10.2 | | | | |
| Add time, hrs/day | | | | | 2.0 | | | | |
| Booster Station (40 KW)gal/hr | | | | | 3 | $ 72,048 | | | |
| Booster Station hr/day @ 125 gpm | | | | | 9.7 | | | | |
| Add time, hrs/day | | | | | 2.0 | | | | |
| Fuel cost, $/gal | | | | | $ 6.75 | | | | |
| Total Diesel Fuel | | | | | | | $ 525,871 | | |
| | | | | | | | | | |
| **Chlorination** | | | | **$6,860** | | | $ 6,860 | | |
| Daily Flow, gpd | 197,600 | | | | | | | | |
| Chlorine dosage, ppm | 1 | | | | | | | | 1 ppm at wells, 1 at Villages |
| Hypochlorite used, gpd | | 1.9 | | | | | | | |
| Hypochlorite cost/gal | $5.00 | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| **Lab Analyses** | | | | **$6,044** | | | $ 6,044 | | |
| | | 1st Year | | | | | | | |
| | Test Cost | #/yr | Cost | | | | | | |
| Total Coliform | $18 | 36 | $648 | | | | | | |
| Lead & Copper | $30 | 10 | $300 | | | | | | |
| Nitrate | $18 | 8 | $144 | | | | | | |
| Nitrite | $18 | 8 | $144 | | | | | | |
| TTHM/HAA | $215 | 4 | $860 | | | | | | |
| Inorganics | $200 | 8 | $1,600 | | | | | | |
| SOCs and Pesticides | $370 | 8 | $2,960 | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs | $250 | 8 | $2,000 | | | | | | | | |
| Radionuclides | $390 | 8 | $3,120 | | | | | | | | |
| Subtotal | | | $11,776 | | | | | | | | |
| | | | | | | | | | | | |
| | | After 1st Year | | | | | | | | | |
| | | #/yr | Cost | | | | | | | | |
| | | 36 | $648 | | | | | | | | |
| | | 5 | $130 | | | | | | | | |
| | | 2 | $36 | | | | | | | | |
| | | 0 | $- | | | | | | | | |
| | | 4 | $860 | | | | | | | | |
| | | 3 | $600 | | | | | | | | |
| | | 3 | $1,110 | | | | | | | | |
| | | 3 | $750 | | | | | | | | |
| | | 1 | $390 | | | | | | | | |
| | | | $4,544 | | | | | | | | |
| | | | | | | | | | | | |
| Lab Contingency (Followup) | | | $1,500 | | | | | | | | |
| | | | | | | | | | | | |
| **Vehicles Expense** | | | | $ 8,250 | | | | $ 8,250 | | | |
| | Miles | $/mile | | | | | | | | | |
| | 15,000 | 0.55 | | | | | | | | | |
| | | | | | | | | | | | |
| **Annual Maintenance Expenses** | | | | **$21,000** | | | | $90,000 | | | |
| Parts/Equipment Allowance | | | $10,000 | | | | $10,000 | | | | |
| Misc Contractors Allowance | | | $5,000 | | | | $10,000 | | | | |
| Generator Maintenance Contract | | | $ 6,000 | | | | $70,000 | | | | |
| Well Generators | 2 | $ 2,000 | | | 2 | $ 25,000 | | | | | |
| BS Generators | 1 | $ 2,000 | | | 2 | $ 10,000 | | | | | |
| | | | | | | | | | | | |
| **Supplies Allowance** | | | | **$10,000** | | | | $10,000 | | | |
| | | | | | | | | | | | |
| O&M Subtotal | | | | **$326,139** | | | | $827,731 | | | |
| | | | | | | | | | | | |
| Contingency | 10% | | | **$32,614** | | | | $82,773 | | | |
| | | | | | | | | | | | |
| O&M Total | | | | **$358,753** | | | | $910,504 | | | |
| | | | | | | | | | | | |
| **Admin Costs** | | | | **$ 20,000** | | | | $ 20,000 | from WSSP | | |
| **Insurance** | | | | **$ 15,000** | | | | $ 15,000 | from WSSP | | |
| **Tribal Fee** | | | | **$ 30,000** | | | | $ - | | | |
| | | | | | | | | | | | |
| **O&M Cost Summary** | | | | | | | | | | | |
| | | | | | | | | | | | |
| Salaries & Benefits | | | | $ 169,208 | | | | $ 169,208 | | | |
| Admin Costs | | | | $ 50,000 | | | | $ 20,000 | | | |
| Insurance | | | | $ 15,000 | | | | $ 15,000 | | | |
| Electricity | | | | $ 104,777 | | | | $ 5,749 | | | |
| Chemicals + Media | | | | $ 6,860 | | | | $ 6,860 | | | |
| Fuel | | | | $ - | | | | $ 525,871 | | | |
| Analytical | | | | $ 6,044 | | | | $ 6,044 | | | |
| Routine Maintenance | | | | $ 10,000 | | | | $ 10,000 | | | |
| Specialized Maintenance | | | | $ 11,000 | | | | $ 80,000 | | | |
| Residuals Disposal | | | | $ - | | | | $ - | | | |
| Vehicle O&M | | | | $ 8,250 | | | | $ 8,250 | | | |
| Misc Supplies | | | | $ 10,000 | | | | $ 10,000 | | | |
| | | | | | | | | | | | |
| Subtotal | | | | $ 391,139 | | | | $ 856,982 | | | |
| | | | | | | | | | | | |
| Contingency | 10% | | | $ 39,114 | | | | $ 85,698 | | | |
| | | | | | | | | | | | |
| Annual O&M Total | | | | $ 430,253 | | | | $ 942,680 | | | |

***Table F.1 (cont'd)***

# Appendix G

## Suggested Chart of Accounts

## Balance Sheet

1000 Current Assets

- 1010 Cash
- 1020 Investments
- 1030 Accounts receivable
- 1040 Inventories
- 1050 Construction Work in Progress
- 1060 (Bad Debts)

2000 Fixed Assets

- 2010 Land
- 2020 Well 1

  Fixed assets may be further broken into major assets, e.g. well, well pump, well booster pump, standby generator, well building, etc.

  2021 Well 1 Pump
- 2030 Well 2
- 2040 Well 3
- 2050 Booster Station
- 2060 Main Storage Tank
- 2070 Sipaulovi Storage Tank
- 2080 Pipelines
- 2090 Operations building
- 2100 Vehicles
- 2110 Miscellaneous Equipment
- 2120 Other Fixed Assets
- 2130 (Accumulated Depreciation)

3000 Liabilities

- 3010 Accounts Payable
- 3020 Notes Payable
  - 3021 Current
  - 3022 Long term
- 3030 Other

4000 Equities

- 4010 Operating Reserve
- 4020 R&R Reserve
- 4030 Debt Reserve

## Income and Expenses

5000 Operating revenues

- 5010 User fee revenue
  - 5011 FMCV
  - 5012 Shungopavi
  - 5013 Sipaulovi
  - 5014 Mishongnovi
- 5020 Water sales to others
- 5030 Other revenue

6000 Operating and maintenance expenses

- 6010 Salaries
  - 6011 Employee Benefits
  - 6012 Training
- 6020 Electrical Power
  - 6021 Well 2
  - 6022 Well 3
  - 6023 Booster Station
  - 6024 Operations Building
  - 6025 Other
- 6030 Chemicals and Fuel
- 6031 Hypochlorite
  - 6032 Diesel Fuel
  - 6033 Other
- 6040 Analytical
  - 6041 Laboratory
  - 6042 Operator Testing Supplies
  - 6043 Lab Equipment Maintenance
- 6050 Administration
  - 6051 Tribal Set-Aside
  - 6052 Insurance

6053 Office and Administrative

6054 Fees and Permits

6055 Miscellaneous

6060 Maintenance

6061 Well 1

6062 Well 2

6063 Booster Station

6064 Main Storage Tank

6065 Sipaulovi Storage Tank

6066 Operations Building

6067 Pipelines and valves

6068 Flowmeters

6069 Vehicles

6070 Supplies

6080 Equipment and Tools

6090 Capital Outlay (<$5,000)

6100 Miscellaneous

## Construction Work in Progress

8000 Income

8010 Proceeds from Grants

8020 Proceeds from Loans

8030 Proceeds from Users

8040 Other Income

9000 Expenditures (divided by project contracts or phases)

9010 Design and planning services

9020 Construction

9021 – Project A etc.

9030 O&M Support Services

9040 IHS Technical Support Services

9050 Other Engineering and Technical Services

9060 Fees and Permits

9070 Taxes

9080 Interest Expense

9090 Administrative Expense

## *Appendix H*

## *This Section Not Used*